ARMENIA

Chemical Risks Assessment
Nairit Chemical Plant - Yerevan

September 2017
VF.1.0
This report is based on the information received and gathered during a two weeks period and therefore cannot be seen as exhaustive, but can be seen as representative of the existing situation.

The opinions expressed in this report are those of the authors and not necessarily of the sponsors or UN Environment or UNOCHA itself.

Proper Terms to Avoid Confusion

Please note that confusion can be avoided if proper terms are used.

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Table of Contents

Executive Summary .......................................................................................................................... 4
List of abbreviations, acronyms and glossary of terms ................................................................. 6
1. Mission background and scope ................................................................................................. 7
   1.1 Context .................................................................................................................................. 7
   1.2 Sensitivity of the context ...................................................................................................... 14
   1.3 Methodology ....................................................................................................................... 14
   1.4 Encountered difficulties ...................................................................................................... 14
2. Findings ...................................................................................................................................... 15
3. Risk analysis ............................................................................................................................... 20
   3.1 Storage conditions .............................................................................................................. 23
       3.1.1 Storage up to 1000 kg .............................................................................................. 23
       3.1.2 Storage over 1000 g ............................................................................................. 25
4. Protection and prevention measures ....................................................................................... 25
   4.1 General measures .............................................................................................................. 25
   4.2 Warehouses ....................................................................................................................... 26
   4.3 Outdoor storage .................................................................................................................. 26
5. Recommendations .................................................................................................................... 28
   5.1 Labelling ............................................................................................................................. 28
       5.1.1 Storage up to 1000 kg ........................................................................................... 28
       5.1.2 Storage over 1000 kg ......................................................................................... 29
   5.2 Repackaging ...................................................................................................................... 30
   5.3 Temporary storage ............................................................................................................. 31
       5.3.1 Packaging below 1’000 kg ..................................................................................... 31
       5.3.2 Packaging over 1000 kg ...................................................................................... 33
   5.4 Chemicals and waste management ...................................................................................... 35
   5.5 Other recommendations .................................................................................................... 37
6. Conclusions ............................................................................................................................... 37
Annexes .......................................................................................................................................... 38
The **UN Environment/OCHA Joint Unit (JEU)** assists Member States in preparing for and responding to environmental emergencies by coordinating international efforts and mobilizing partners to aid affected countries requesting assistance. By pairing the environmental expertise of United Nations Environment and the humanitarian response network coordinated by the United Nations Office for the Coordination of Humanitarian Affairs (OCHA), the JEU ensures an integrated approach in responding to environmental emergencies. The Environmental Emergencies Centre (EEC) ([www.eecentre.org](http://www.eecentre.org)) is an online tool designed to build the capacity of national responders to environmental emergencies developed by the JEU.

The **Union Civil Protection Mechanism (UCPM)** facilitates co-operation in disaster response, preparedness, and prevention among 31 European states (EU-28 and the Former Yugoslav Republic of Macedonia, Iceland, and Norway). With the support of the European Commission, Participating States pool resources and experts that can be made available to disaster-stricken countries all over the world as well as for prevention and preparedness operations. When activated, the Mechanism coordinates the provision of assistance from its Participating states. The European Commission manages the Mechanism through the Emergency Response Coordination Centre (ERCC). Operating 24/7, the ERCC monitors risks and emergencies around the world and serves as an information and coordination hub during emergencies. Among other tasks, the ERCC also ensures that Participating States are fully aware of the situation on-site and can make informed decisions for providing financial and in-kind assistance. For more information, please refer to the ECHO website and/or ERCC Portal. The Union Civil Protection mechanism closely cooperates with the United Nations and it participated in several joint missions.

The **Swiss Agency for Development and Cooperation (SDC)** designs its activities to reduce poverty and hardship, curb global risks and promote development that preserves natural resources for future generations. The **Swiss Humanitarian Aid** (SHA), as a part of SDC, acts through prevention and rescue measures, contributing to safeguarding lives of endangered people and alleviating suffering. At the multilateral level, it works to create a more effective international system for responding to crisis.

The **Swedish Civil Contingencies Agency (MSB)** is responsible for issues concerning civil protection, public safety, emergency management and civil defence as long as no other authority has responsibility. Responsibility refers to measures taken before, during and after an emergency or crisis.

The fire and rescue service of Yvelines department (**SDIS 78**) from the **French Civil Protection** is responsible of fire, first aid and specific responses as chemical hazards.
Executive Summary

Following a fire of lacquer ethynol tanks, which occurred in Nairit Chemical Plant in Yerevan, Armenia on 28 August 2017, a team of experts, was sent to the site, upon the request of the Ministry of Emergency Situations of the Republic of Armenia to assess the remaining chemical risks. The team was mobilized with support of UN Environment and the UN Office for the Coordination of Humanitarian Affairs, through their Joint Unit (JEU). Experts were provided through the Swiss Agency for Development and Cooperation as well as from Sweden and France, with support of the (European) Union Civil Protection Mechanism.

They spent two weeks in Yerevan and confirmed that the risk of additional incidents pertains, if the hazards remain present. Nonetheless, this risk can be reduced by the following proposed measures:

<table>
<thead>
<tr>
<th>Measure</th>
<th>Cost</th>
<th>Implementation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identifying and labelling chemicals properly</td>
<td>USD 5,000</td>
<td>Immediate</td>
</tr>
<tr>
<td>Repacking the chemicals in need</td>
<td>USD 0.5 to 1 million</td>
<td>Immediate</td>
</tr>
<tr>
<td>Centralised storage</td>
<td>USD 100,000</td>
<td>Immediate</td>
</tr>
<tr>
<td>Recycling/Treatment/Dumping</td>
<td>Up to USD 10 million, depending on ability to find maximum of buyers and reduce quantities to be treated</td>
<td>Follow logical order: • Gas (Chlorine, Ammonia) • Liquids • Pulverulent solids • Solids</td>
</tr>
</tbody>
</table>

Once the chemicals are safely packed, treated or sold, it is strongly recommended to:

- Commission a study to conduct a thorough assessment of legacy environmental issues of the plant in order to remedy them and allow for environmentally sustainable decommissioning.
- Implement an environmental clean-up.
- Implement a communication campaign on this sensitive issue, in order publicise the information, arguments and justifications behind its decision.
- Operate in respect with the international best practices regarding the Health and Safety Executive (HSE) measures to protect workers and the surrounding population.

Advancing on the above recommendations will require strong political and financial engagement, where it is recommended that the process be started as soon as possible.
List of abbreviations, acronyms and glossary of terms

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABC</td>
<td>Atomic – Biological - Chemical</td>
</tr>
<tr>
<td>BLEVE</td>
<td>Boiling liquid expanding vapour explosion</td>
</tr>
<tr>
<td>CAS</td>
<td>Chemical Abstracts Service</td>
</tr>
<tr>
<td>CMEA</td>
<td>Council for Mutual Economic Assistance</td>
</tr>
<tr>
<td>ECHO</td>
<td>European Commission’s Humanitarian Aid and Civil Protection Directorate General</td>
</tr>
<tr>
<td>GHS</td>
<td>Globally Harmonised System (Refers to chemical hazards)</td>
</tr>
<tr>
<td>HSE</td>
<td>Health, Safety and Environment</td>
</tr>
<tr>
<td>IBC</td>
<td>Intermediate Bulk Container</td>
</tr>
<tr>
<td>IR</td>
<td>Infrared</td>
</tr>
<tr>
<td>ISBL</td>
<td>In Side Battery Limit</td>
</tr>
<tr>
<td>JEU</td>
<td>UN Environment/OCHA Joint Unit</td>
</tr>
<tr>
<td>MES</td>
<td>Armenian Ministry of Emergency Situations</td>
</tr>
<tr>
<td>MSDS</td>
<td>Material Safety Data Sheet</td>
</tr>
<tr>
<td>NGO</td>
<td>Non-Governmental Organization</td>
</tr>
<tr>
<td>OCHA</td>
<td>(UN) Office for the Coordination of Humanitarian Affairs</td>
</tr>
<tr>
<td>PCR</td>
<td>Polychloroprene Rubber</td>
</tr>
<tr>
<td>PPE</td>
<td>Personal Protective Equipment</td>
</tr>
<tr>
<td>SDC</td>
<td>Swiss Development and Cooperation Agency</td>
</tr>
<tr>
<td>SHA</td>
<td>Swiss Humanitarian Aid Unit</td>
</tr>
<tr>
<td>UCPM</td>
<td>(European) Union Civil Protection Mechanism</td>
</tr>
<tr>
<td>UN</td>
<td>United Nations</td>
</tr>
<tr>
<td>UNDP</td>
<td>United Nations Development Programme</td>
</tr>
<tr>
<td>USSR</td>
<td>Union of Soviet Socialist Republics</td>
</tr>
<tr>
<td>MSB</td>
<td>Swedish Civil Contingencies Agency</td>
</tr>
</tbody>
</table>

An environmental emergency is defined as a sudden onset disaster or accident resulting from natural, technological or human-induced factors, or a combination of these, that cause or threaten to cause severe environmental damage as well as harm to human health and/or livelihoods.

UNEP/GC.22/INF/5, 13 November 2002
1. **Mission background and scope**

An explosion followed by a subsequent fire occurred at the Nairit Chemical plant at 01:10 pm on 28 August 2017 (see front page picture). A similar accident was also recorded on 15 May 2009, at the same location.

The Nairit factory is a synthetic rubber plant commissioned in Yerevan in 1939. It has been the flagship of the chemical industry in Armenia and in the Union of Soviet Socialist Republics (USSR) and was employing several thousands of people, covering more than 130 ha.

In 1989, the factory was closed for environmental consideration, as well as due to the collapse of the Council for Mutual Economic Assistance (CMEA) business model. Various attempts to revive Nairit only prolonged a slow decline which ended with the declaration of bankruptcy on 30 November 2016. A bankruptcy administrator was then appointed by the Ministry of Justice.

Nairit Plant Closed Joint-Stock Company (CJSC) has accumulated over 150 types of chemicals that are stored in different places and conditions all across its territory.

In order to prevent further perilous incidents at the plant, the Minister of Emergency Situations requested assistance from the UN, namely UNOCHA and the JEU, to assess the chemical risks and threat posed by Nairit storages.

A mission consisting of three experts was subsequently mobilized:

- Laurent Nicole, Switzerland, deployed through the Swiss Agency for Development and Cooperation (SDC)
- Melviana Heden, Sweden, deployed through the (European) Union Civil Protection Mechanism (UCPM), with support of the Swedish Civil Contingencies Agency (MSB)
- William Cruz-Morey, France, deployed through the UCPM, with support of Yvelines Fire and Rescue Service (Department)

The initial scope of the mission, given in Annex 1, was discussed with the Minister of Emergency Situations during the first day of mission and can be summarized as:

- Assessing the chemical and environmental risks posed by the chemical storages in Nairit premises;
- Developing recommendations to allow reducing and managing the risks;
- Developing proposals to eradicate the risks.

1.1 **Context**

**General site history**

The Nairit Chemical Plant complex occupies a large plot, around 130 ha, to the south of Yerevan city centre, within the industrial park area. Originally, the site was located away from residential areas however, with the passage of time, it has now been absorbed and is currently within the city limits. Thus, the health, safety and environmental performance of the site has a direct impact on the health and welfare of Yerevan’s residents.

The production started in 1940\(^1\), based on the calcium carbide route to acetylene (now largely abandoned everywhere, except in China), which was then hydrochlorinated to chloroprene monomer, from which the main synthetic Polychloroprene Rubber (PCR) was obtained.

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Over the years the production was expanded, first to 14 kta of PCR in 1942 and then up to 45 kta of PCR in 1961. Due to the expansion of the city towards the site and the environmental impact of acetylene production from calcium carbide, the site switched to the natural gas route to acetylene and, in 1965, the acetylene production from natural gas was launched. This, together with a revamp of the chloroprene production unit, allowed further expansion of acetylene-based PCR production to 75 kta.

In parallel, a new Acetic Acid (AA) unit, based on the British Distillers process, using light naphtha as a feedstock, under a BP Chemicals licence, was started up in the 1970s, but only achieved design capacity in early 1980s.

Likewise, due to the poor safety record of the chloroprene production from acetylene, a parallel 75 kta chloroprene-from-butadiene production process was set up under licence from BP Chemicals. The plant was started up in 1983, and reached design capacity in 1987. In addition, a new PCR line based on a DuPont technology was installed in 1986, so as to allow production of up to 50 kta of PCR.

During the Soviet times the plant accounted for a large share of the world global synthetic rubber production. Specifically, in 1987, the plant accounted for 15% of the global supply.

These changes allowed a shutdown of chloroprene production from acetylene, improving the inherent process safety, as well as decommissioning of the old PCR lines in 1988.

The demise of the USSR and the resultant logistics issues for the site resulted in the supply of both light naphtha and butadiene from the newly formed Russian Federation being either cut or greatly reduced, due to a break out in hostilities elsewhere in the Caucus mountains region and revised feedstock pricing.

The plant was first shut down in 1989 and restarted operations at a smaller capacity in 1993. Several attempts were made to attract investors and re-commission the plant to its full capacity, yet all of these attempts failed, given the underlying economics, i.e. the costs
associated with importing the feedstock butadiene from Russia, as well as the high cost of process energy, given increasing gas import costs.

In June 2015 a World Bank report\(^1\) stated that: The Nairit plant is an unsustainable liability for the Government and continues to be a major drain on the Government\(^2\), as the plant was not anymore operational since 2011 when the private owner abandoned it and was in major financial distress. Bankruptcy was finally declared on 30 November 2016.

The liabilities of the plant exceed AMD 121 billion (USD 250 million), including the sovereign guaranteed loan from the Commonwealth of Independent States (CIS) Inter-state Bank, which has not been repaid. The company has not generated any revenues and relied on borrowing from Yerevan TPP to finance the salaries and maintenance costs since 2010. The total debt of the company to Yerevan TPP is AMD23 billion (USD 48 million).

The book value of assets is less than 50% of the outstanding value of debts and payables. This means that the company's assets are not sufficient to meet its liabilities and a substantial share of equipment has significantly deteriorated.

The World Bank expert’s conclusions were, amongst others, that the condition of Nairit Chemical Plant assets is such that the plant cannot be easily brought back into operation without significant capital cost investment, regardless of which scenario is chosen.

The liquidation process should include a detailed environmental assessment of the plant. The Government should commission a study to conduct a thorough assessment of legacy environmental issues of the plant in order to remedy them and allow for environmentally sustainable decommissioning.

**Present situation**

Today, solely around 110 persons, namely key management staff, storekeepers and guards are left on the Nairit premises, when at the top of its glory several thousands of workers were active on-site.

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\(^{1}\) The responsibility for the Nairit plant falls under the Ministry of Energy and Natural Resources, and it became a financial burden for the power sector.
For almost seven years, the plant’s activities have been stopped and nature has reclaimed its place. An impressive silence hits the visitors of such an enormous industrial skeleton.

**Picture 3:** Slow corrosion

**Picture 4:** Growing trees
The progressive halt of the plant during the past twenty-five years left many chemicals stored in different conditions all around the site. The following maps shows the location of the main storages. Annex 5 analyses each storage in details, showing the content, the conditions of storage and packaging, as well as the chemical reactivity of each chemical.
Chemicals are packed in containers between half a kilo to several tenths of tons. The package conditions range from totally destroyed to almost untouched.
Some of the chemicals are stored mainly outside, in large tanks of different shapes.
1.2 Sensitivity of the context

Beside the technical description given above, it must be underlined that the Nairit Chemical Plant case is particularly sensitive in Armenia for both political and economic reasons. Many promises had been made and broken, and hope has vanished.

Ex-employees are protesting in town on a regular basis, for the many years of unpaid wages. In the meantime, the overall debt of the bankrupt company is placing a toll on the Armenian state budget.

1.3 Methodology

A team of three experts was sent to Yerevan by the JEU to carry out a chemical risks assessment of the Nairit plant, after the 28 August 2017 incident.

The team was composed of the following experts:

- A firefighter, Regional advisor on chemical risks, Head of a French Emergency Centre specialist of industrial chemical risks;
- An environmental-development engineer, specialist of waste and hazardous waste management;
- A chemical engineer, specialist of hazardous material and industrial site assessment.

The chemical risks assessment of Nairit plant has been organised in steps:

- Existing data collection
- History of past incidents
- Detailed site visits
- Nairit employees interviews
- Chemicals identification, quantities estimate, location mapping, IR pictures of tanks
- Chemicals list update
- Chemicals hazards and compatibility table
- Chemicals risk analysis

In order to support the risk assessment, a set of recommendations along with a general strategy of action has been developed.

1.4 Encountered difficulties

The recent history of Nairit and its turbulences make the data collection tributary of the few remaining staff. The reliability of the data showed some weakness and needed serious crosschecking.

Aside from the language barrier which was overcome thanks to the strong support received from the MES’s international relations team, the identification through old trade or brand names, familiar terminology or local names, as well as aligning these to international terminology required serious efforts.

The support provided by the present plant management was appreciated and tremendously helpful. Nonetheless, limited proactivity slightly complicated the investigation.
2. Findings

As a consequence of the slow agony of the Nairit Chemical Plant, only part of the installation has been properly emptied and cleaned from its chemicals.

In the meantime, part of the installations has been dismantled during the past two decades and the process is still on-going.
Chemicals are mainly stored or deposited in more than thirty-five main areas, all across the site. Storage sites are various in type and quality, from appropriate to fully inappropriate.

**Picture 13:** Storage ............... (Sept. 2017)

Despite storekeepers seeming to know the content of the storages, the identification of chemicals and the level of compatibility is never mentioned or indicated.

**Picture 14:** Typical chemical identification in Nairit Chemical Plant (Sept. 2017). No indication of hazards, no indication on compatibility, etc.

Number of chemicals are not identified, containers are deeply corroded, and the readable indications on the container do not correspond with the chemical inside.
No Material Safety Data Sheet (MSDS) was found for the stored chemicals. It has been part of the mission to collect the most suitable ones, given in Annex 8.

In terms of fire prevention and protection, only a few fire extinguishers were observed and no detector nor monitoring procedure could be identified.

An important parameter which seems to be underevaluated is the presence of asbestos in various areas of the plant. The most problematic will be the thermal insulation of pipes and seals on reactors openings, pipes connections, etc.

Picture 15: Highly corroded container, storage 29 (Sept 2017)

Picture 16: Potentially containing asbestos seal (Sept 2017)
Picture 17: Potentially containing pipe insulation being cut (Sept 2017)

Picture 18: The lowest pipe is covered with a fibered cement potentially containing asbestos, the other pipes seem to be covered with glass wool material. (Sept 2017)

Cement fibered roofing material and wall covering material is also to be considered and handled according to best practices. As asbestos is strongly bound in cement it presents less of a risk.
The fire which destroyed one of the storages of lacquer-ethynol had not been fully extinguished, instead was kept under control to avoid collateral damages. It was still carbonizing almost 4 weeks after the incident with varying intensity as detected by the IR camera.

In addition, one would notice that the tank located immediately beside the silo on fire, is keeping an acceptable temperature. Observation also shows that the shy water cooling on the top has a limited impact.

Several other lacquer-ethynol tanks can be found in storage area 16.

The lacquer-ethynol can be found dissolved in toluene or solidified due to more than 20 years of storage.
3. Risk analysis

The risk analysis has been oriented towards the chemical risks more than the potential environmental impact. The latter should be subjected to separate detailed environmental assessment.

To define a risk of incident, scenarios can be organised in six main categories:

- **Corrosion:** old containers exposed directly to corrosive chemicals or meteorological conditions. A table has been drawn to show the hazards of each stored chemical and its compatibility with other chemicals or its container (see Annex 3). A proper organised storage with repacked identified chemicals will reduce this risk drastically for chemicals in small packaging (below one ton). For large containers, tanks and silo, case by case study is still needed, in terms of condition of the content, container, retention pool, etc.

- **Carelessness:** while dismantling or during storage operations, especially when chemicals are not clearly identified on tanks. Once the chemicals are properly identified, labelled, packed and stored, the risk of a man-made accident will be significantly reduced, allowing more time to find a proper solution to eliminate, recycle or dump the chemicals.

- **Malicious act:** An intentional act has many unpredictable origins, from terrorism to revenge. Proper storage with the necessary security measures and close controlling of access to the site will reduce that risk significantly. The sensitive elements being the dispersed tanks and silo still containing chemicals.

- **Natural hazard:** Seism risk is the most likely hazard, due to the impact earthquake aftermaths may have on the old structures, causing further incidents.

- **Electrical incident:** If a large part of the plant has been de-energized, some networks may still be under tension. This could be a source of short-circuit and a consequent fire ignition. Isolation of the still functional networks will prevent that risk.

- **Asbestos air contamination:** Brittle asbestos fibered cement used for thermal insulation of pipes running across Nairit site implies a chronical contamination of air and therefore a permanent threat on people walking across the site.

![Picture 22: Old leak due to corrosion on acid tank](image-url)
A simplified causes and aftermaths analysis of chemical dispersion is summarized in the diagram below:

**Figure 1: Simplified diagramme**

Asbestos is clearly a separate cause of concern present throughout the plant. Release of fibres can happen anytime, as damages have been, and are still, caused to asbestos-containing structures. Observations show that insulation can also fall down due the age of the material or the disaggregation of the reinforcing metal net. One of the difficulties with assessing asbestos risk is the latency time. In effect, 40 years may pass before symptoms of asbestos exposure are observed in humans.

Three main scenarios can be identified based on above explanations:

**SCENARIO 1:** Ammonia leak, storage 11

**Figure 2: Evaluation of atmospheric dispersion of NH₃**
The limits of threat zones are established using the AEGL1-2-3* for 1 hour of exposition. This simulation shows that several damages for health may only occur inside the limits of Nairit. However, it is crucial to keep in mind that “notable discomfort, irritation, or certain asymptomatic non-sensory effects” may be felt outside. Those effects are not disabling and are transient and reversible upon cessation of exposure. Such an event requires public rescue teams and will have a mediatic and political impact.

**SCENARIO 2:** Fire puddle, storage 16

A spill of the content of a toluene tank may create a flammable puddle of approximately 300m². The simulation shows that thermal radiation of that puddle fire would not have several effects outside the site.

**SCENARIO 3:** BLEVE of a tank, storage 16

In case of a fire puddle, a tank could be exposed for a long time period, creating a BLEVE (boiling liquid expanding vapour explosion). A BLEVE could have lethal effect (orange limit) and several burns (yellow limit) outside the limit of the site.
In conclusion, scenarios 1 and 2 correspond to the worst case with a higher probability of occurrence. Albeit no severe impact being forecasted, firefighters will still be needed to contain the effect of the incident.

Scenario 3 is a consecutive effect of scenario 2 (domino effect) in case of non-adequate response, showing the importance of securing a sufficient water flow as well as a proper emulsifier supply.

3.1 Storage conditions

Approximately 35 different storages area are scattered all around the site which can be classified into 2 categories:

- Storages with a unit capacity less than 1000 kg or litres (from bags of 20 kg to IBC) containers can be moved easily,
- Storages with a unit capacity greater than or equal to 1000 kg or litres: chemicals are stored in fixed tanks and need to be transferred in a mobile tank or repacked in smaller containers prior to removing them from the site.

3.1.1 Storage up to 1000 kg

Chemicals stored in “small” packaging, from 0.5 kg to IBC, are mainly stored in 3 buildings (Storage 27, 28, 29 on the map). Many other smaller storages exist on the site.

The principle of grouping is clearly relevant but the ways of grouping and storing need to be improved:

Positive

- Access is sealed by padlocks;
- A log book is kept by the storekeeper recording all entries made;

Negative

- Identification of chemicals is usually limited to a piece of paper with the name and quantity of the product
- No identification of hazards

Picture 23: Log-book showing the opening of each storage door
• Incorrect indications as to which chemicals are contained in a container;
• No protection against rain
• No consistency in method of storage, in terms of identical chemicals being stored in different places and types of containers
• No suitable fire and emergency response model (especially fire protection equipment)
• No retention tray for liquids
• No separation of incompatible chemicals
• Exposure to the sun
• Loose security measures on access to the grounds (E.g. accessible windows)

![Picture 24: Storage 29, from the window at the ground level](image)

### 3.1.2 Storage over 1000 kg

The stored volumes are consequent and reach thousands of litres per tank. Tanks can be located on the ground, underground (not buried), in superstructures or on rails.

![Picture 25: Used oil storage](image)  ![Picture 26: Sulfuric acid on rails](image)
The large tanks are mainly made of steel, with or without protecting inside layer. Some are or have been insulated with glass wool, mainly gone today. Tanks are exposed to climate conditions without maintenance for decades and showing significant traces of corrosion.

![Image of storage tanks](image_url)

**Picture 27:** Storage 15, valves are blocked....

As the valves are oftentimes blocked, the content transfer will require specific case-by-case solutions.

**Positive**
- .......

**Negative**
- No product or hazard identification
- Only rare indication of level (IR camera will be useful)
- In several cases, unknown content has been noted as a side-product of processes
- Valves blocked or sealed by corrosion
- Structural weakness due to corrosion
- Some initially liquid chemicals turned into solid across the time (E.g. lacquer-ethanol)

4. Protection and prevention measures

4.1 General measures

Despite the site no longer being in operation and being dismantled, minimum protective measures must nonetheless exist as long as chemicals remain stored on-site.

A clear smoking ban must be applied in the vicinity of storages of flammable materials. The hazard panel contributes to the correct application of this directive. Staff instruction is equally needed.

Work by hot spots, (cutting with blowtorch, angle grinder, etc.), numerous during dismantling must be the subject of preventive measures which, in Europe, would be:
- Daily work permit delivered by the site management
• Control of explosimetry
• Dedicated fire protection means in the direct vicinity
• Specific personal protective equipment (PPE) for workers
• After-work monitoring, ensuring no hot spot has been left behind
• Etc.

Lightning remains one of the main causes of ignition on storages of flammable products outdoors. This study did not particularly analyse this point as lightning rods are visible across the site. Nevertheless, particular attention must be paid to this.

Extinction water, in case of an incident, should be contained in order to be treated as not directly compatible with environment. Therefore, sewage networks should be equipped with isolation valves and extinction water collection pools.

4.2 Warehouses

Constructive measures
• Natural ventilations must exist in each room with low air inlets and air outlets in the upper part. These ventilations must be sized to also evacuate smoke from fire. Upper openings of 1 m² per 200 m² of floor space should be sufficient.
• Building doors and windows must be properly closable and kept closed.
• Full compartmentation of the concrete structure must ensure chemicals separation and reduce the fire spread probability.
• Liquid products must be stored on slatted floor in a retention tray.

Organizational measures
• Storage at a single height helps reducing the potential heat exposure to a fire start, thus reducing the risk of a major incident.
• Access must be restricted to authorized and trained personnel. PPE must be worn for handling operations (Eyewear, Type 4 protective suit, FFP2)

Fire protection equipment
• A stock of absorbent material must be provided near the compartment (dry sand as a minimum requirement)
• ABC Powder Extinguishers (due to the incompatibility of some products with water) must be placed close to the access area with one 9 kg extinguisher per 200 m² of floor space.
• Each compartment containing flammable liquids must have 2 additional ABC 9 kg extinguishers. (Usual European rules)

4.3 Outdoor storage

The situation of each storage must be specially analysed.

Constructive measures
• Clear identification of tanks still in use
• Decommissioning of tanks not in use
• Retention tray must exist under each tank
• Chemicals, capacity and hazard identification must be clearly indicated according to international standards
Assessment of water and foam concentrate supplies

- Water and emulsifier capacities must be present. The extinction of a polar liquid fire such as toluene requires the use of polyvalent foam-based foam according to NF EN 1568-1 to 4 standards.
- With an operational application rate of 20 l/m²/min, considering the reference scenario 2,6000 l/min are needed.
- Considering the absence of internal emergency services and an automatic extinguishing system, it is advisable to consider an extinction time of 2 hours.
- The water requirement is therefore 720 m³ per 2 h.
- The need for foam concentrate based on a conventional foamer used at 3% for polar liquids is 21,600 litres (estimated cost USD 80,000).

The capacity of the existing hydraulic network could not be clearly determined, but the 28 August incident clearly proved its inadequacy.

Number of existing empty tanks could be used, after inspection and proper decommissioning (Storage 16 for instance) for extinction water storage to meet the above-mentioned objective.

Adequate pressure and flow of a fixed network would allow a faster intervention (possible re-use of existing network?). Connections in sufficient numbers must be made available for the fire vehicles. The tanks need access from the top.

Similarly, a good distribution of the foam concentrate stocks, in the vicinity of flammable liquids storages must be envisaged (Lacquer-ethynol, toluene ...)

The equipment for injecting foam concentrate and spraying the foam must be at the disposal of the fire brigade. The use of Firedos® devices or equivalent would be appropriate.

Such materials have the advantage of being robust and accurate without electronics. They can, depending on the model, be used on fixed installations as well as with hoses.

![Diagram of water and foam concentrate supplies]

**Figure xx**: Sample for Firedos® installation (rate could be higher than 2000 l/min)

All these measures must be drawn up and validated with the Ministry of Emergency Situations.
5. **Recommendations**

In order to mitigate the risk of incident in Nairit Chemical Plant in the shorter possible delay, the following action should be started immediately:

1. Labelling of all chemicals
2. Repacking chemicals packed in poor conditions
3. Properly conducting temporary storage
4. Chemical / waste management

Point four needs to be further studied where a study on this can be immediately initiated.

5.1 **Labelling**

5.1.1 **Storage up to 1000 kg**

The identification of chemicals follows two major safety objectives:

- Informing on hazards, to enable workers and rescue services to protect themselves and adopt the right course of action,
- Avoid storage errors: incompatibility of products, unsuitable container, etc.

Most chemicals have been stored for many years. The important task of grouping, identifying and quantifying chemicals has already been completed. Nevertheless, the system put in place, as shown in the Chapter Findings, is strongly relying on the remaining storekeepers’ memory, and is hardly comprehensible by any other person.

By using the knowledge of the storekeepers and the international identification of hazard, given in Annex 3 for all identified chemicals, the proper labelling must replace the “flying” labels with a sustainable solution properly fixed to the container or group of containers (pallets) (PP-film or similar). The size of the label must not be smaller than 20 cm x 20 cm.

The use of simplified labels from the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) is strongly recommended.

These labels must include at least:

- Place and date
- Hazards pictograms
- Chemical name in English and Armenian
- CAS number
- Quantity

Labels must be plastic-coated to avoid degradation.

This action can be initiated immediately, before repacking and/or moving chemicals from one storage to another. The attached table (Annex 3) gives all the elements required for chemical labelling, including the associated MSDS\(^3\).

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\(^3\) The Material Safety Data Sheet MSDS given in annex are given as example for a given product.
The labelling operation will not require more personnel than the on-site existing one. The cost will therefore be limited to the manufacture of laminated labels and can be estimated to be around USD 5,000.

**Warning:** Despite the care taken in translating and searching the corresponding CAS numbers, some products with no labelling, apart from handwritten paper, identification errors are possible. Only laboratory analysis can guarantee perfect identification.

It is wise to consider moving and isolating oxidizer products immediately.

### 5.1.2 Storage over 1000 kg

The tanks must be identified as any other chemical, as described in Paragraph 5.1.1.

These labels must include at least:
- Place and date
- Hazards pictograms
- Chemical name in English and Armenian
- CAS number
- Quantity

Labels must be plastic-coated to avoid degradation.

In the case of flammable products, the surrounding zone must be labelled prohibiting smoking, producing flames or spurs. The dimensions of the panels must allow a reading at ten meters.

In addition, using the UN number associated with the hazard code and pictograms will be a good solution, adding information.
5.2 Repackaging

To ensure storage in good conditions while awaiting a treatment solution, many products must be repackaged. Repackaging must be optimized to allow storage, handling, transport and easy treatment solution. It seems appropriate to choose small containers of about 50–60 litres.

- The container material must be compatible with its chemical content. For details refer to the Annex 8 MSDS, or to the chemicals storages mapping Annex 5.

- For liquids, manual transfer between two containers should be avoided and replaced by the use of transfer pump compatible with the chemical, or drained by gravity through suitable piping. For flammable liquids, earthing of the system is imperative.

- The operations must be done in well-ventilated space.

  In the case of flammable products, the packaging must be earthed.

- Suitable PPE should be worn (suit, filter mask, gloves, boots).

Type 3 PPE, with a broad-spectrum cartridge mask (A2, B2, E2, K2, P3), is sufficient for all operations, except for ammonia and nitric acid, which requires PPE type 1 (gas tight).

- Secondary containers must be labelled after filling with the same labels as initially.

The attached table and MSDSs provide guidance for proper storage.

Cost is estimated between USD 0.5 and 1 million for purchasing containers, PPE, etc.

A proper quick formation of Nairit Chemical Plant workers could be sufficient to launch this.
5.3 Temporary storage

5.3.1 Packaging below 1’000 kg

In order to rapidly reduce the risk of incidents, a reorganisation of the storages is needed, considering the compatibility of chemicals, type of containers, needs of specific conditions, etc. The very first indication will be to concentrate the chemicals (in movable containers) in one or two storages rather than more than 30.

The specification for the storage can be summarised as:

- Strong building with proper doors and no accessible windows, about 4,000 m²
- Natural ventilation
- Distance from the limits of the site
- Building accessible from 3 sides
- Easy to ensure security
- Storage by categories and compatibilities (Acid – Caustic – Oxidant – Flammable – etc.)
- Only one level
- Liquids stored in retention pools with adequate absorbent stored beside
- Dry sand and ABC extinguisher adequately positioned.

A building has been identified within the premises of the plant: the P3 on the main plant map nomenclature.

Map 2: Location of the suitable building P3
In terms of construction, the building should be prepared following these recommendations:

- Side protective wall
- Access ramps when needed;

- Fire resistant separation walls;
• Observe the fire safety recommendations detailed in paragraph 4 (ventilation, absorbent, fire extinguishers, etc.)
• Have a safety shower or equivalent device to treat a contamination accident (Dipotéline® sprayer)

As previously mentioned, all flammable liquid transfer must be secured with proper earthing, regardless of the size of the containers. Therefore, the earthing connection must be prepared adequately.

A rapid cost estimate of the rehabilitation of the building, ensuring waterproofing, closing, compartment for different types of chemicals, etc., equates in around USD 100,000.

Work for an approximate amount of USD 100,000 would make the building suitable for temporary storage of chemicals while awaiting evacuation site.

5.3.2 Temporary storage organization

Five different types of compartment must be created:

- Flammable products

- Oxidizers

- Corrosive products by physically separating the acids and bases

- Products harmful to health and environment

The table below shows the intercompatibilities of these different classes of products.

Some chemicals may not fit into this categorization. It should refer to the MSDS and table in Annex 3 to verify the absence of incompatibility.
- It is recommended to store the products at ground level and avoid overlaps.
- Retentions are necessary under liquid storage.

**General table of compatibility**

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</table>

+ Products can be stored together
0 Products can be stored together only if certain conditions are applied,
■ Product can’t be stored together

Sufficient spaces must exist between different products to allow their manipulation. All identical products are stored together.
5.3.3 Storage over 1000 kg

The quantities involved forbid repackaging of products. A case-by-case study should be conducted to verify safety conditions, in terms of corrosion, quality of the chemicals (possible degradation or polymerisation, etc.).

In the case of the lacquer-ethynol solidified inside tanks, the material must be sampled with care to determine its flammability and hardness in order to determine the methodology to implement to empty the tanks. One of the possible techniques could be a water high pressure cutter.

These storages must be earthed if it is not already done.

Retention must be effective under different storage conditions.

The most hazardous chemicals, in terms of possible incident, such as ammonia or lacquer ethynol, should be evacuated as early as possible.

Products stored in wagons (sulfuric acid and sodium hypochlorite), which do not have retention, should also be evacuated quickly.

5.4 Chemicals and waste management

During the process of labelling and properly identifying the chemicals, large-scale market research must be conducted in order to identify potential buyers for some of the products or companies able to recycle or retreat them, with a focus on the national as well as international market.

The general table given in Annex 3 proposes a selection of products which should find clients.

Summarized diagramme of the overall process:
Some of the chemicals have a calorific value which should show some interest for cement factory but potentially also for thermal plants.

In less favourable cases, chemicals will have to be incinerated in specific installations, corresponding with the best practice in terms of air and waste emission.

Finally, in the worst case, chemicals will be considered as hazardous waste and will have to be prepared in order to be dumped in a specifically well-prepared dumpsite.

As the most problematic loss of confinement is the one of the more mobile products, it is recommended to follow a logical way and handle them in this order:

- Gas (Chlorine, Ammonia)
- Liquids
- Pulverulent solids
- Solids

5.5 Other recommendations

Visible chemicals are of course only one part of the threat posed by Nairit Chemical Plant. After decades of operations, different type of incidents, changes of ownership, management and finally bankruptcy, the environmental impact and difficulties of proper decommissioning and dismantling cannot be neglected. In order to address these issues, the mission recommends:

- Commissioning a study to conduct a thorough assessment of legacy environmental issues of the plant in order to remedy them and allow for environmentally sustainable decommissioning.
- Implementing an environmental clean-up.
- Implementing a communication campaign on this sensitive issue, in order to publicise information, arguments and justifications behind its decision.
- To operate in respect with the international best practices regarding the HSE measures to protect workers and the surrounding population.

The hazardous waste / chemical management is a serious issue at the country level. In-depth reflection must be conducted in order to develop a national strategy, and subsequently a masterplan on hazardous waste management, including:

- Industrial waste produced now
- Industrial waste heritage from the past
- Obsolete pesticides and fertilisers
- Domestic hazardous waste ending in the domestic dumpsite
- Hospital and medical waste
- It is strongly recommended to broaden the vision in order to integrate at least a country wide view if not a regional one.
- A Nairit Chemical Plant specific solution might be out of reach in terms of costs and might not find a political justification
• In this sense, it might be useful to link the Nairit case with running projects such as the elimination of obsolete pesticides (POP).

• In the same way, other projects linked with PCBs forth-coming and might be associated with this.

6. Conclusion

The time allocated to the Nairit Chemical Plant’s assessment has not been enough to conduct detailed and exhaustive revision of each and every corner. The mission focused on the chemical risks and believes to have seen the major storages across the site.

If the hazards are present, the risk of a major catastrophe, impacting the neighbouring population, is limited but real nonetheless. This calls for immediate mitigations.

The proposed measures can be implemented immediately and will significantly reduce the risk of an incident.

The solutions for eradicating the chemical risk in Nairit Plant must be studied carefully, considering a sustainable business model and including a country wide approach at minimum.

Advancing on the above recommendations will require strong political and financial engagement, where it is recommended that the process be started as soon as possible.
# Annexes

<table>
<thead>
<tr>
<th>Annex</th>
<th>Title</th>
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<tbody>
<tr>
<td>1.</td>
<td>Request for assistance and mission TOR</td>
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<tr>
<td>2.</td>
<td>Team composition</td>
</tr>
<tr>
<td>3.</td>
<td>Chemical inventory details and characteristics</td>
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<td>4.</td>
<td>Last existing processes</td>
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<td>5.</td>
<td>Chemicals location mapping</td>
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<td>6.</td>
<td>MSDS</td>
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<td>7.</td>
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</table>
ANNEX 1

Request for assistance and mission Terms of Reference
Հավելություն

Հեղինակյալության առաջարկությունով ֆիզիկայի ու մեխանիկայի երկրագրական աշխատանքների համար հանրային լուծում առաջարկում են հեղինակություններ: Պարտավոր է ստորագրել:

Հավելված

Հ. Ն."
Request for assistance

Herein I express my concern over the emergency in "Nairit factory", which is an object representing high risk for technological disaster, expecting your support in conducting professional examinations for reducing the risks related to the hazardous chemical materials stored and accumulated since the soviet times.

A striking evidence of that was the fire incident occurred on August 28, initiated after self-ignition of lacquer ethylene, resulting to 300 sq.meters of burned volume and spread of the byproduct of the chemical combustion towards Yerevan city. The fire was extinguished by the great efforts of the rescue forces of the Ministry of Emergency Situations, avoiding a massive chemical disaster. This accident became just another impulse proper examination of the given issue.

The Nairit Factory is an artificial rubber producer in Yerevan, founded in the Soviet Union in 1939. In 1989, the factory was closed for environmental considerations. During operation Nairit Plant CJSC has accumulated about 150 types of chemicals that are kept in different places and conditions. The most dangerous of them are lac ethinol 1273,128 tones, blend of monocarboxylic acids 95-97% 310 m³, liquid chlorine 99,9% 1,600 tones, chlororganic waste 100,89 tones, dichlorides (1-4; 3-4 DBB) 21 tones, Toluol (absorbent) 11% DUA 142,756 tones, stabilizer (tollol + pirocatechin + water) 4 tones.

In the lights of the above mentioned I request assistance of UN OCHA for conducting the relevant assessment and draw the recommendations on chemical substances risk prevention and mitigation solutions.
UN Environment / OCHA Joint Unit

Terms of Reference
Advisory mission, Armenia
Assessment of chemical risk and mitigation measures in relation to the fire at Nairit chemical plant

Background

The Nairit factory is an artificial rubber producer in Yerevan, founded in the Soviet Union in 1939. In 1989, the factory was closed for environmental considerations. During its operations Nairit Plant CJSC has accumulated about 150 types of chemicals that are kept in different places and conditions (see official request letter for more details).

On August 28, a layer of lacquer ethylene self-ignited, resulting in about 300 sq. metres of burned waste and spread of chemical fumes towards Yerevan city. The fire was extinguished by the rescue forces of the Ministry of Emergency Situations (MoES) which avoided a massive chemical disaster.

There is now an urgent need to conduct a detailed assessment of the situation at the Nairit plant, looking both at the baseline situation at the plant which led to the event, but also evaluating the risk posed by remaining chemical substances, and develop proposals for appropriate mitigation measures.

Following the official request from the Government of Armenia to the United Nations office in Armenia on 1 September, the UN Environment / Office for the Coordination of Humanitarian Affairs (OCHA) Joint Unit (JEU) is looking for chemical emergency experts to support an advisory mission in response to the chemical accident at the Nairit plant.

Responsibilities

The overall objective of the advisory mission is to review the situation which led to the emergency at the Nairit plant and assess the impacts of the emergency, and additionally to identify and evaluate the current risk posed by the Nairit plant and to develop recommendations for the prevention and mitigation of chemical risk.

The mission will be conducted in close collaboration with the MoES of Armenia, the OCHA Regional Office for Central Asia and the Caucasus and the United Nations Development Programme in Armenia, as well as with other actors and experts with knowledge in the area of chemical risk assessment and mitigation. The involvement of international and national public health actors will also be considered.

The overall responsibilities of the mission will be to, in collaboration with national actors:

- Review the overall context which led to the fire at the Nairit plant
- Support the national authorities in evaluating the impacts to human health and environment from the incident (sampling was conducted immediately after the incident and analysis results should be consulted as part of the mission)
• Identify remaining chemical hazards located at the Nairit plant, and conduct a rapid risk assessment of associated risks
• Identify and prioritize areas for mitigation of chemical risk at the Nairit plant, with focus on the remaining chemicals and associated risk factors
• Advice on possible need for further sampling and analysis, to be be conducted by national counterparts,
• Support relevant actors in the first steps to implement concrete risk mitigation measures, and the linking of these into the overall response and governance structures of the country
• Identify any outstanding expertise or equipment needs to address any immediate risks and impacts to humans and the environment
• Advise the UN on key issues and possible support required from the international community
• Communicate rapidly and regularly all findings of the analysis to national authorities, as well as UN in country and the JEU, emphasizing the possible need for additional specialized expertise and/or additional equipment as required;
• Identify, where applicable, pre-existing contributing environmental factors contributing to the water pollution (e.g. chemical pollution/composition, aquatic diseases, deforestation, lack of prevention and preparedness);

Note: Contact with media, including interviews, will only be undertaken with consent of the UN Resident Coordinator.

The mission is expected to deploy as soon as possible and stay in Yerevan for 2-3 weeks.

Education and work experience
• Solid background in chemical emergency / industrial accident preparedness and response
• University degree in natural sciences, engineering, applied sciences or similar
• Experience in conducting chemical risk assessments at industrial facilities
• Experience in developing chemical emergency preparedness plans and mitigation measures
• Ability to distinguish immediate response actions from medium to long-term mitigation, rehabilitation and reconstruction activities;
• Familiarity with chemical emergency rapid sampling & assessment methodologies, knowledge of the Flash Environmental Assessment Tool
• Ability to coordinate with international and local agencies involved in disaster response;
• Ability to rapidly assess basic needs and local capacities;
• High motivation, coupled with an ability to improvise effectively in rapidly changing situations with minimal guidance and support;
• Team skills required for working in a multi-disciplinary, multi-national team in field conditions of hardship with an ability to assume authority as and when needed;
• Availability for short-notice mobilization (within 6 to 48 hours) and must be able to stay in the field for up to 3 weeks;
• Availability for additional follow-up, collaboration and editing of mission report after the official mission deadline, if required
• Knowledge of MS Windows and MS Office and ability to operate standard IT and communications equipment
• Knowledge of Russian is preferred, but not mandatory
ANNEX 2

Team composition

- **Laurent Nicole**, Switzerland, Chemical engineer EPF-SIA, Health and Safety Engineer CFST, deployed through the Swiss Agency for Development and Cooperation (SDC);

- **Melviana Heden**, Sweden, Environmental specialist, deployed through the (European) Union Civil Protection Mechanism (UCPM), with support of the Swedish Civil Contingencies Agency (MSB);

- **William Cruz-Morey**, France, Regional advisor on chemical risks, Head of the French Emergency Centre SDIS78, specialist of industrial chemical risks, deployed through the European Union Civil Protection Mechanism (UCPM);
ANNEX 3

Chemicals inventory details and characteristics
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**Condition to Avoid:**
- Strong oxidizing agents, acids, bases in liquid and elevated.
- Strong oxidizing agents, acid, oxidizing agents, water.
- Strong oxidizing agents, acid, oxidizing agents.
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- Strong oxidizing agents, acid, oxidizing agents.
- Strong oxidizing agents, acid, oxidizing agents.
- Strong oxidizing agents, acid, oxidizing agents.
- Strong oxidizing agents, acid, oxidizing agents.
- Strong oxidizing agents, acid, oxidizing agents.
- Strong oxidizing agents, acid, oxidizing agents.
- Strong oxidizing agents, acid, oxidizing agents.
- Strong oxidizing agents, acid, oxidizing agents.
- Strong oxidizing agents, acid, oxidizing agents.
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<tr>
<th>No.</th>
<th>Chemical Name</th>
<th>CAS Number</th>
<th>Chemical Name</th>
<th>Level of Purity</th>
<th>State (S, L, G)</th>
<th>Incompatibility Materials</th>
<th>Condition to Avoid</th>
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<tr>
<td>130</td>
<td>Sodium hydroxide</td>
<td>1310-73-2</td>
<td>Sodium hydroxide</td>
<td>L</td>
<td>g</td>
<td>-</td>
<td>Strong oxidizing agents, strong acids, organic materials</td>
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<td>131</td>
<td>Polyethylene oxide</td>
<td>9004-47-5</td>
<td>PE Wax (vegetable)</td>
<td>Kg</td>
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<td>Kg</td>
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<td>133</td>
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<td>134</td>
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<td>Ethyl</td>
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<td>Kg</td>
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<td>135</td>
<td>Catalyst used in the production of hydrogen</td>
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<td>Kg</td>
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<td>Hydrochloric acid waste</td>
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<td>137</td>
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<td>Kg</td>
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<td>Waste XA-30</td>
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<td></td>
<td>Kg</td>
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<td>139</td>
<td>Arsenic</td>
<td></td>
<td></td>
<td>S</td>
<td>Kg</td>
<td>1</td>
<td>NH, NH, NH, NH, NH, NH, NH, NH</td>
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<tr>
<td>140</td>
<td>Mixture of monochloroacetic acid, 2-chloroethanol, formaldehyde, and other oxidizing agents</td>
<td></td>
<td></td>
<td>L</td>
<td>Kg</td>
<td>1</td>
<td>NH, NH, NH, NH, NH, NH, NH, NH</td>
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<td>141</td>
<td>Propionic acid (unsaturated)</td>
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<td>Propionic acid (unsaturated)</td>
<td>Kg</td>
<td>1</td>
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<td>143</td>
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<td>Kg</td>
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<tr>
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<tr>
<td>145</td>
<td>Chlorine</td>
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<tr>
<td>147</td>
<td>Reverse NaCl Brine</td>
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<td>Kg</td>
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<tr>
<td>149</td>
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<td></td>
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<td></td>
<td>L</td>
<td>Kg</td>
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<tr>
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<td></td>
<td>Kg</td>
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<td>Kg</td>
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<td>7782-36-4</td>
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<td>Kg</td>
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<tr>
<td>156</td>
<td>Molybdenum</td>
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<tr>
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<td>Kg</td>
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<tr>
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<td>Sodium</td>
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<td>Sodium</td>
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<td></td>
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<tr>
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<td>126-99-8</td>
<td>Sodium</td>
<td>Kg</td>
<td>1</td>
<td>NH, NH, NH, NH, NH, NH, NH, NH</td>
<td></td>
</tr>
</tbody>
</table>

**Note:** The table above lists various chemicals and their associated properties, levels of purity, states, and incompatibility materials. The conditions to avoid are noted for each chemical to prevent reactions or hazards.
ANNEX 4

Last existing process

Existing Process Units – Acetylene Route

Summary of Main Process Units (ISBL)

The In Side Battery Limit (ISB) units are listed below:

- **Chlor-Alkali (C-A) Unit:**
  - Area 1-1: Solvay process area for CO₂ production
  - This area includes lime kilns for CO₂ production that is required to produce sodium bicarbonate, Na₂CO₃. This in turn is required to precipitate out the impurities contained within raw brine prior to its electrolysis. Depending on the production scenario undertaken, it may be more cost effective to simply import sodium carbonate rather than operate these rather old kilns.
  - Area 1-4 a, b: Brine Production and Treatment
    - This area includes the brine extraction well-sand planned brine solution treatment.
  - Area 1-3 a, c: Caustic Soda (NaOH) Production
    - This area includes the brine treatment unit, as well as caustic soda production facilities
  - Area 1-3 b: Brine Electrolysis
    - This area is the heart of the Chlor-Alkali unit; it comprises the diaphragm electrolysis cells which use purified brine to produce both hydrogen and chlorine, as required by the site, leaving behind residual cell liquor, which is re-circulated back to Area 1-3 a, c for caustic soda production
  - Area 1-5: Hydrogen Chloride (HCl) production
    - This area contains HCl furnaces as well as falling film absorber packages
  - Area 1-20: Liquid Chlorine and Sodium Hypochlorite Production
    - This area contains the chlorine liquefaction and sodium hypochlorite unit.

- **Acetylene Production Unit (Natural Gas based):**
  - Area 1-6: Air Separation Unit, for the production of oxygen, nitrogen, and instrumentation air
  - Area 1-7a: Partial Oxidation Unit, for the production of cracking gas, containing a large acetylene fraction. This area also includes a black water treatment plant and a solids incineration unit.
• Area 1-7b: Acetylene Extraction Unit, which uses NMP solution as an extraction medium for acetylene separation from the rest of the cracking gas.

• Chloroprene (CR) Monomer Unit:
  • Area 1-12a: Production of Mono-Vinyl-Acetylene (MVA) from acetylene. This unit includes
  • Acetylene compression and MVA synthesis and absorption into toluene.
  • Area 1-12b: Production of Chloroprene from MVA. This unit includes MVA desorption from toluene solvent, MVA hydro-chlorination synthesis section and Chloroprene distillation (involving stabilization with NO)
  • Stabilized chloroprene from Area 1-12b is then sent to Area 1-18 (described below) for neutralization before being sent to the PCR rubber unit.
  • Area 1-19: Liquid and chlorinated hydrocarbon waste incineration unit. This area is used to incinerate any liquid and chlorinated hydrocarbon waste generated within chloroprene monomer unit based.
  • Area 1-18: Although the equipment of this area relates mostly to the monomer production from butadiene, it also includes a nitric oxide preparation unit (from nitric acid), which is then fed to Area-12b (chloroprene distillation), to stabilize chloroprene monomer. Furthermore, the final neutralisation of the chloroprene monomer from acetylene is also carried out here.

• Poly-Chloroprene Rubber (PCR) Unit:
  • Area 1-21: Recovery of recycled chloroprene. In this area, crude chloroprene monomer incoming from the chloroprene monomer unit (Area 1-18) is mixed with chloroprene recycle stream from chloroprene polymerization and degassing (Area 1-22), is distilled and sent to polymerization reactors within Area 1-22.
  • Area 1-22: Chloroprene polymerization and degassing. This area consists of a batch polymerization reaction section and subsequent degassing of the crude PCR latex product.
  • Area 1-23: Rubber finishing lines. This area includes two latex drying and extrusion lines, as well as associated PCR rubber packaging lines.

Condition of the Main Process Units – ISBL

Chlor-Alkali Unit

Process Overview
The key function of the chlor-alkali unit is produce HCl, necessary for the hydrochlorination of the mono-vinyl acetylene (MVA), which is the final synthesis step of the chloroprene monomer production from acetylene. The unit by-products are caustic soda, NaOH (part used for internal needs, part exported), hydrogen (utilised for internal fuel needs) and sodium hypochlorite NaOCl (bleach, also exported).

Each area is reviewed in more detail below.

Areas 1-4 a, b: Brine Production and Treatment
This area includes the brine extraction wells, and initial brine solution treatment.

The raw brine, produced from underground leaching wells (Area 1-4 a) located outside Yerevan city.

The existing brine pipeline is now defunct. The new proposed route, due to land ownership issues, currently is supplied for treatment via a 42 km-long pipeline to a raw brine treatment Area (1-4 b).
The brine field was commissioned in 1971 with a design capacity of 45,000 m³ of brine per year, operating with 5 wells.

As of present, the brine field consists of 5 wells, which are linked to CJSC “Nairit Plant” via a single pipeline. The amount of wells in operation can be varied depending on brine consumption rate.

Given that construction works in the Area 1-4 b are currently in progress, brine treatment takes place in Area 1-3 a instead.

**Area 1-3 a: Brine Treatment**

This area receives brine from the incoming feed pipe to the site, as well as the recycled brine from the caustic production. The brine is purified using a Solvay type process, so that Chlorinated Lime is also produced. As such, Lime furnace area 1-1 is considered part of this process area 1-3a.

**Area 1-3b: Brine Electrolysis**

After the treatment, purified brine solution, with NaCl concentration of 300-310 g/l is fed to electrolysis cell rooms, located in Chlor-Alkali production Area 1-3b, where diaphragm electrolysis process takes place. Direct current is applied to the electrolysis cells. The main reaction taking place at the anode is the reduction of chloride ions into chlorine gas which can be summarized by the following reaction:

$$2\text{Cl}^- - 2\text{e}^- \rightarrow \text{Cl}_2$$

The main electrolytic process at the cathode is the dissociation of water molecules and the formation of hydrogen, which can be summarised by following reactions:

$$\text{H}_2\text{O} + 2\text{e}^- \rightarrow 2\text{OH}^- + 2\text{H}^+$$

$$2\text{H}^+ + 2\text{e}^- \rightarrow \text{H}_2$$

In the remaining solution, Na⁺ and Cl⁻ ions form sodium hydroxide:

$$\text{Na}^+ + \text{OH}^- \rightarrow \text{NaOH}$$

The chlorine gas is then fed through titanium heat exchangers, where it is cooled with circulating water and fed to drying towers. Wet chlorine gas undergoes drying with 98% sulphuric acid to reduce its moisture content to at least 150 ppm. The current unit was first commissioned in 1986.

**Area 1-3 c: Caustic Soda Production**

Spent cell liquor from the electrolysis cells contains NaOH at a concentration of 110-140 g/l which is pumped into an Evaporation Area (Area 1-3ac), where, at least 44 % caustic soda (NaOH) is formed through a 3-stage evaporation, part of which is used for the operation’s own needs and the remaining part is sold.

Quicklime is produced in a Lime Separation Section by limestone calcining in lime kilns and is used for production of calcium chloride solution and waste water neutralization. Lime surplus is sold to outside consumers. The resultant flue gas by-products are used for the treatment of brine supplied to electrolysis and for production of caustic soda needed for acetylene production from natural gas. Year of commissioning 1936;

Design capacity 50,000 t/year in terms of lime;  
Actual capacity 15,800 t/year; (nominal due to idling)

The last large scale revamp of this section took place in 1983.

Part of this equipment needs complete replacement. For the remaining part, some parts and assemblies should be replaced.
**Area 1-20: Liquid Chlorine Production**

Dried chlorine gas is compressed and is either used for chlorine liquefaction in the Chlorine Liquefaction Area (1-20) if the plant is operating to produce butadiene rubber, or used for the production of hydrogen chloride and 31% hydrochloric acid, if the plant is producing acetylene rubber.

This latter production mode also uses electrolytic hydrogen with minimum concentration of 98%.

The Chlorine Liquefaction and Chlorine Gas Production section was commissioned in 1980 with a design capacity of 60,000 tonnes per year of liquid chlorine. Chlorine liquefaction is a combined one stage process, which yields liquid chlorine at a pressure of 2.5 kg/cm² (2.42 atm) when cooled with brine at -30°C. Hydrogen chloride production is based on the combustion of hydrogen in chlorine gas in specially designed furnaces.

Hydrogen chloride is used as a feed in Area 1-12ab, for MonoVinylAcetylene (MVA) hydrochlorination, which in turn is used for chloroprene production.

Hydrogen Chloride and Synthetic Hydrochloric Acid Section has the following nominal capacity:

- 34,000 ton/year of hydrogen chloride
- 23,000 ton/year of synthetic hydrochloric acid

Liquefaction off-gases containing 45-80% of chlorine are either delivered to produce hydrochloric acid or supplied to the off-gases neutralization unit to produce commercial sodium hypochlorite (Area 1-20) according to the following reaction:

\[
2\text{NaOH} + \text{Cl}_2 \rightarrow \text{NaCl} + \text{NaOCl} + \text{H}_2\text{O}
\]

**Block Flow Diagram**

Schematic Block Flow diagram of Chlor-Alkali production for acetylene route is shown below.

**Figure D-1: Chlorine Production (Acetylene Route) Block Flow Diagram**

Source: Jacobs Consultancy Ltd.
ANNEX 5

Chemicals location mapping

Note:

Number of the chemicals listed and located during the mission will have to be repacked before further temporary storage and treatment. It is therefore strongly recommended to adopt state of the art procedures such as standard European procedures for decanting. The same will apply to asbestos containing material which have not been mapped yet.
Foreword

- A large scale map of the Nairit site is given as separate annex.
- Satellite images are extracted from Google Earth. The North is always on the top of the picture.
- Buildings drawings are not at scale and are approximate, given only for general information.
- A overall table of the chemicals identified on site is given as a separate annex. All the sub-tables given for each storage are extracted from the main table.
- The list of chemical is “as observed on-site” and does not pretend to be exhaustive.
- For all information related to chemicals, refer to the MSDS given as annex. The Presented MSDS are extracted by the mission from different supplier’s websites, not necessarily from the original supplier of the assessed chemical.
- The proposed pictures are directly related to what has been observed in a given storage during the assessment. All chemicals have been photographed in their storage context.
- This compilation does not pretend du be exhaustive and information must be double-checked on the ground.
STORAGE 1

General map of Nairit plant

Satellite view

Detailed position within the building

Room 2.13 of the main administrative building

Pictures

The safe box, sealed, containing the chemicals

Security conditions

Small quantities stored in a safe box, in a closed room.
# Chemicals characteristics table

<table>
<thead>
<tr>
<th>№</th>
<th>ID (Inventory number)</th>
<th>Chemical name</th>
<th>CAS number</th>
<th>Level of purity</th>
<th>State (S, L, D)</th>
<th>Incompatibility Materials</th>
<th>Condition to Avoid</th>
</tr>
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<td></td>
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</table>

**Comments:** The chemicals are stored in small quantities in a sealed safe box and have not been touched for decades.
STORAGE 2

General map of Nairit plant

Satellite view

Detailed position within the site

Pictures
Security conditions

Tanks showing light signs of corrosion, exposed to weather conditions

Bags stored without care
### Chemicals characteristics table

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<th>Condition to Avoid</th>
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</tbody>
</table>

*Incompatibility Materials: Strong oxidizing agents, Alkaline.*

*Condition to Avoid: Avoid contact with water.*
STORAGE 3

General map of Nairit plant

Satellite view

Detailed position within the site

Some remaining of lacquer-ethanol in the other tanks.

Pictures

The white elements are remaining of glass wool

The thermal picture shows that the tank is not empty
Security conditions
Some tanks have a poor and partial cooling system and damaged insulation if any. The thermal pictures shows that the tank is half full.
<table>
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<th>Level of purity</th>
<th>State (S, L, G)</th>
<th>Solubility</th>
<th>Rubraq</th>
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<th>Incompatibility Materials</th>
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<td>(      )</td>
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<td>L</td>
<td>Kg</td>
<td>86,000.000</td>
<td>(          )</td>
<td>(      )</td>
<td>Strong oxidizing agents</td>
<td>Heat, Flames and sparks</td>
<td></td>
</tr>
</tbody>
</table>
STORAGE 4

General map of Nairit plant

Satellite view

Detailed position within the site

Pictures

Security conditions
Tank exposed to weather conditions, presenting signs of corrosion
Chemical characteristics table

<table>
<thead>
<tr>
<th>№</th>
<th>Item description (Inventory number)</th>
<th>Item name (Chemical name)</th>
<th>CAS number</th>
<th>Level of purity</th>
<th>State (S, L, G)</th>
<th>Density (in kg/m^3)</th>
<th>Quantity (in kg/m^3)</th>
<th>Incompatibility Materials</th>
<th>Condition to Avoid</th>
</tr>
</thead>
<tbody>
<tr>
<td>51</td>
<td>2501900100 հացիքային պահեստական համակարգ (14-33%)</td>
<td>Calcium chloride</td>
<td>10043-02-4</td>
<td>31-35% solution</td>
<td>L, Kg</td>
<td>20 452.00</td>
<td></td>
<td></td>
<td>Strong oxidizing agents</td>
</tr>
<tr>
<td>127</td>
<td>Ուղեղանոց հատ (ուղեղականի մատակարարություն)</td>
<td>NaCl solution (with organic extracts)</td>
<td>L</td>
<td>m^3</td>
<td>300.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
General map of Nairit plant

Satellite view

Detailed position within the site

21 t mixture of Dichlorobenzene

Pictures

Thermal picture showing that at least one tank is half full
Security conditions

Flammable chemical stored in a vertical tank in a retention, corroded with a large vapour volume.
### Chemicals characteristics table

<table>
<thead>
<tr>
<th>No.</th>
<th>Inventory number</th>
<th>Chemical name</th>
<th>Level of purity</th>
<th>State</th>
<th>UN number</th>
<th>Incompatibility Materials</th>
<th>Condition to Avoid</th>
</tr>
</thead>
</table>

**Comment:** needs an incineration in specific conditions.

- High risk due to the important vapor phasis.
- Should be evacuated as priority.
- Limited quantity, could be repacked in 200 l barrels awaiting for final evacuation.
STORAGE 6

General map of Nairit plant

Satellite view

Detailed position within the site

Mixture of catalyster

Pictures
Security conditions
Exposed to weather conditions, presenting signs of corrosion
Mixture not clearly identified
## Chemicals characteristics table

<table>
<thead>
<tr>
<th>№</th>
<th>Chemical name</th>
<th>Level of purity</th>
<th>State (S, L, G)</th>
<th>Unit</th>
<th>Quantity</th>
<th>Incompatibility Materials</th>
<th>Condition to Avoid</th>
</tr>
</thead>
<tbody>
<tr>
<td>163</td>
<td>Catalyst (5% copper naphtalene in white spirit)</td>
<td>L</td>
<td>Kg</td>
<td>40,000</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
STORAGE 7

General map of Nairit plant

Satellite view

Detailed position within the site

Pictures
Security conditions
Mission could not confirm if the installation were cleaned or not.
### Chemicals characteristics table

<table>
<thead>
<tr>
<th><strong>№</strong></th>
<th><strong>Nairi Inventory number</strong></th>
<th><strong>Chemical name</strong></th>
<th><strong>CAS number</strong></th>
<th><strong>Level of purity</strong></th>
<th><strong>State (S, L, G)</strong></th>
<th><strong>Contact with water</strong></th>
<th><strong>Incompatible materials</strong></th>
<th><strong>Condition to Avoid</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>31</td>
<td>2000100540</td>
<td>2-25103-58-6</td>
<td>S</td>
<td>Kg</td>
<td>200.0</td>
<td></td>
<td>Strong oxidizing agents</td>
<td>-</td>
</tr>
</tbody>
</table>
STORAGE 8

General map of Nairit plant

Satellite view

Detailed position within the site

Pictures
Security conditions

Old vertical tanks presenting signs of corrosion.
Possible liquid leaks.
Not clearly identified content. It could be the 2-chlorobut-1,3-diene CAS 126-99-8

Comment: needs an incineration in specific conditions.

High risk due to the important vapour phases.
Should be evacuated as priority.
Limited quantity, could be repacked in 200 l barrels awaiting for final evacuation.
### Chemicals characteristics table

<table>
<thead>
<tr>
<th>№</th>
<th>Inventory number</th>
<th>Chemical name</th>
<th>Level of purity</th>
<th>State (S, L, G)</th>
<th>Incompatibility Materials</th>
<th>Condition to Avoid</th>
</tr>
</thead>
<tbody>
<tr>
<td>162</td>
<td>126-98-8</td>
<td>Chloroprene</td>
<td>L</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
STORAGE 9

General map of Nairit plant

Satellite view

Detailed position within the site

Pictures

Tanks located below ground level, in a concrete pool
Security condition

Open tanks with important vaporization of chemicals.

No fire detection.
**Chemicals characteristics table**

<table>
<thead>
<tr>
<th>No</th>
<th>Nane (Chemical name)</th>
<th>CAS number</th>
<th>Chemical name</th>
<th>Level of purity</th>
<th>State (S, L, O)</th>
<th>Mass/weight</th>
<th>Incompatibility Material</th>
<th>Condition to Avoid</th>
</tr>
</thead>
<tbody>
<tr>
<td>70</td>
<td>26001060000</td>
<td>872-50-4</td>
<td>Methyl pyridone</td>
<td>S</td>
<td>Kg</td>
<td>44 400.0</td>
<td>Strong acids, Strong oxidizing agents, Strong reducing agents</td>
<td>Heat, flames and sparks.</td>
</tr>
</tbody>
</table>
STORAGE 10

General map of Nairit plant

Satellite view

Detailed position within the site

Pictures
Security conditions

Carbon black solidified sludge in open pool.

Need to be analysed.
## Chemicals characteristics table

<table>
<thead>
<tr>
<th>№</th>
<th>Inventory number</th>
<th>Source</th>
<th>CAS number</th>
<th>Chemical name</th>
<th>Level of purity</th>
<th>State (S, L, G)</th>
<th>Incompatibility Materials</th>
<th>Condition to Avoid</th>
</tr>
</thead>
<tbody>
<tr>
<td>137</td>
<td>Секс (гірська)</td>
<td></td>
<td></td>
<td>Carbon black (industrial waste)</td>
<td>S</td>
<td>L</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
STORAGE 11

General map of Nairit plant  Satellite view

Detailed position within the site

Pictures

Ammonia tanks with thermal insulation
Liquid pool with green wastewater (Chromate?).

Security conditions
Ammonia under pressure, in insulated tanks.
Little leaks exists which release vapours.
Chemicals characteristics table

<table>
<thead>
<tr>
<th>#</th>
<th>Material/ (Inventory number)</th>
<th>Material/ Chemical name</th>
<th>CAS number</th>
<th>Chemical name</th>
<th>Level of purity</th>
<th>State</th>
<th>Material/ chemical usage</th>
<th>Incompatibility Materials</th>
<th>Condition to Avoid</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>200417333 2004-45 7</td>
<td>Ammonia</td>
<td>7664-41-7</td>
<td>100%</td>
<td>G</td>
<td>Kg</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

High priority to evacuate!
Should be saleable as being commonly used in the industry.
STORAGE 12

General map of Nairit plant

Satellite view

Detailed position within the site

2000 m³ CaCl₂

Pictures

Tanks exposed to weather conditions presenting signs of corrosion
Security conditions

Ammonia under pressure in corroded tanks without insulation.
Little leaks with release of vapour.
### Chemicals characteristics table

<table>
<thead>
<tr>
<th>№</th>
<th>Inventory number</th>
<th>Chemical name</th>
<th>CAS number</th>
<th>Level of purity</th>
<th>State (S, L, G)</th>
<th>Weight (Kg)</th>
<th>Evaluation</th>
<th>Incompatibility Materials</th>
<th>Condition to Avoid</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>2600107300</td>
<td>Ammonia</td>
<td>7664-41-7</td>
<td>100%</td>
<td>G</td>
<td>53,368.00</td>
<td>2</td>
<td>5, 6</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Most common metals are not affected by dry ammonia. However, when combined with water vapor, ammonia will attack copper, zinc, or alloys containing copper as a major alloying element. Therefore, these materials should not be used in contact with ammonia. Heating of cylinders, as the increase in pressure, means a direct relationship to increase in temperature. When the gas is exposed to temperatures in the range 449°C at 490°F (260°C, 930°F), decomposition will occur, with the release of nitrogen and hydrogen. The hydrides could form explosive gaseous mixtures. Never use cylinders as millers or supports, or for any other purpose other than the storage of ammonia.</td>
</tr>
<tr>
<td>51</td>
<td>2201900100</td>
<td>Calcium chloride solution</td>
<td>10043-52-4</td>
<td>31-33%</td>
<td>L (Kg)</td>
<td>20,432.00</td>
<td></td>
<td></td>
<td>Strong oxidizing agents</td>
</tr>
</tbody>
</table>

High priority to evacuate!
Should be saleable as being commonly used in the industry.
General map of Nairit plant

Satellite view

Detailed position within the site

Pictures
Security conditions

Tanks with damaged insulation, presenting signs of corrosion.

All tanks are in a retention pools.
## Chemicals characteristics table

<table>
<thead>
<tr>
<th>№</th>
<th>Subject inventory number</th>
<th>Unidentified (Chemical name)</th>
<th>CAS number</th>
<th>Chemical name</th>
<th>Level of purity</th>
<th>State (L, G)</th>
<th>Stability</th>
<th>Materials</th>
<th>Incinerability</th>
<th>Condition to Avoid</th>
</tr>
</thead>
<tbody>
<tr>
<td>145</td>
<td>Смесь монокарбоновых кислот (гексановой, изоксилиновой, ацетоновой) и водных растворов этилового спирта.</td>
<td>A mixture of monocarboxylic acids (hexanoic, isokxylinic, acetone) and aqueous solutions of ethanol.</td>
<td>L</td>
<td>m³</td>
<td>3/16</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Can be easily incinerated
STORAGE 14

General map of Nairit plant

Satellite view

Detailed position within the site

Pictures

Ion exchanging resin
Hydrochloric acid

Sodium hydroxide solution

Security conditions
## Chemicals characteristics table

<table>
<thead>
<tr>
<th>№</th>
<th>Inventory number</th>
<th>(\text{Укзялшш}^{(1)}) (Chemical name)</th>
<th>CAS number</th>
<th>Chemical name</th>
<th>Level of purity</th>
<th>State (S, L, G)</th>
<th>Mass unit ((\text{kг}^{(2)}))</th>
<th>Value</th>
<th>Incompatibility Materials</th>
<th>Condition to Avoid</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>2600114500</td>
<td>(\text{Укзялшш}^{(1)}) (Anhille)</td>
<td>7647-01-0</td>
<td>Hydrochloric acid</td>
<td>29-29%</td>
<td>Kg</td>
<td>2,763.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>2300040100</td>
<td>(\text{Укзялшш}^{(1)}) ((\text{Укзялшш}^{(1)}))</td>
<td>7647-01-0</td>
<td>Hydrochloric acid</td>
<td>29-29%</td>
<td>Kg</td>
<td>7,750.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>58</td>
<td>2601300100</td>
<td>(\text{Укзялшш}^{(1)}) (Cationite CL 2-8)</td>
<td>1310-73-2</td>
<td>Sodium hydroxide</td>
<td></td>
<td>Kg</td>
<td>28,720.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>130</td>
<td>(\text{Укзялшш}^{(1)}) (Nitr directive)</td>
<td>1310-73-2</td>
<td>Sodium hydroxide</td>
<td></td>
<td>Kg</td>
<td>25,223.00</td>
<td></td>
<td></td>
<td>Strong oxidizing agents, Strong acids, Organic materials</td>
<td></td>
</tr>
</tbody>
</table>
General map of Nairit plant

Satellite view

Detailed position within the site

Pictures
Security conditions
## Chemicals characteristics table

<table>
<thead>
<tr>
<th>№</th>
<th>.FileNotFoundException</th>
</tr>
</thead>
<tbody>
<tr>
<td>141</td>
<td>Пропионовая кислота</td>
</tr>
<tr>
<td></td>
<td>79-09-4</td>
</tr>
<tr>
<td></td>
<td>Propionic acid</td>
</tr>
<tr>
<td></td>
<td>(substandard)</td>
</tr>
<tr>
<td></td>
<td>¹²</td>
</tr>
<tr>
<td></td>
<td>48310</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>142</td>
<td>Диэтиловый эфир</td>
</tr>
<tr>
<td></td>
<td>108-20-3</td>
</tr>
<tr>
<td></td>
<td>Isopropyl ether</td>
</tr>
<tr>
<td></td>
<td>¹²</td>
</tr>
<tr>
<td></td>
<td>4844</td>
</tr>
</tbody>
</table>
STORAGE 16

General map of Nairit plant

Satellite view

Detailed position within the site

Pictures

Thermal picture showing the level of liquid in the tank
Security conditions

Serious signs of corrosion and unreliable retention pool
## Chemicals characteristics table

<table>
<thead>
<tr>
<th>N°</th>
<th>National registry number</th>
<th>Scientific name</th>
<th>CAS number</th>
<th>Level of purity</th>
<th>State (S, L, G)</th>
<th>Solubility</th>
<th>Reactivity</th>
<th>Incompatibility Materials</th>
<th>Condition to Avoid</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td>20000300500</td>
<td>Nitric acid</td>
<td>7697-33-2</td>
<td>50-55%</td>
<td>L, Kg</td>
<td>5,168,000</td>
<td></td>
<td>Acids, Halogen compounds,</td>
<td>Strong oxidizing agents.</td>
</tr>
<tr>
<td>30</td>
<td>2000160500</td>
<td>Dimethyl ether</td>
<td>107-12-7</td>
<td>99.5%</td>
<td>S, Kg</td>
<td>2,963,000</td>
<td></td>
<td>Acids, Halogen compounds,</td>
<td>Strong oxidizing agents.</td>
</tr>
<tr>
<td>39</td>
<td>2000171000</td>
<td>Lacquer</td>
<td></td>
<td></td>
<td>L, Kg</td>
<td>57,000,000</td>
<td></td>
<td>Acids, Halogen compounds,</td>
<td>Strong oxidizing agents.</td>
</tr>
<tr>
<td>105</td>
<td>2000197000</td>
<td>Toluene</td>
<td>108-88-3</td>
<td>99.5%</td>
<td>L, Kg</td>
<td>60,000,000</td>
<td></td>
<td>Acids, Halogen compounds,</td>
<td>Strong oxidizing agents.</td>
</tr>
<tr>
<td>113</td>
<td>2000197000</td>
<td>Tetrahydrofuran</td>
<td>106-74-3</td>
<td></td>
<td>L, Kg</td>
<td>556,000</td>
<td></td>
<td>Acids, Halogen compounds,</td>
<td>Strong oxidizing agents.</td>
</tr>
</tbody>
</table>
STORAGE 17

General map of Nairit plant

Satellite view

Detailed position within the site

Pictures
Security conditions
### Chemicals characteristics

<table>
<thead>
<tr>
<th>№</th>
<th>Code/Inventory number</th>
<th>CAS number</th>
<th>Chemical name</th>
<th>Level of purity</th>
<th>State (S, L, G)</th>
<th>Storage</th>
<th>Railways</th>
<th>Incompatibility Materials</th>
<th>Condition to Avoid</th>
</tr>
</thead>
<tbody>
<tr>
<td>13</td>
<td>2300400100</td>
<td>7667-01-0</td>
<td>Hydrochloric acid</td>
<td>29-39%</td>
<td>Kg</td>
<td>74 409.00</td>
<td></td>
<td>Bases, Ambers, Acidic solids</td>
<td>Metal, permanganates, e.g. potassium permanganate, Thiochrome, metal oxides, hexavalent chloride</td>
</tr>
</tbody>
</table>
General map of Nairit plant

Satellite view

Detailed position within the site

Pictures
Security conditions
## Chemicals characteristics table

<table>
<thead>
<tr>
<th>No.</th>
<th>Substance (memory number)</th>
<th>Ubrqeevuf (Chemical name)</th>
<th>CAS number</th>
<th>Chemical name</th>
<th>Level of purity</th>
<th>State (S, L, G)</th>
<th>Varnqilli gilqirin</th>
<th>Rubwiq</th>
<th>Incomptability Materials</th>
<th>Condition to Avoid</th>
</tr>
</thead>
<tbody>
<tr>
<td>130</td>
<td>Наркий кимеатерикий (CO1) технологи</td>
<td>1310.73-2</td>
<td>Sodium hydroxide</td>
<td>L</td>
<td>q</td>
<td>25 223.00</td>
<td></td>
<td></td>
<td>Strong oxidizing agents, Strong acids, Flammable materials</td>
<td></td>
</tr>
<tr>
<td>143</td>
<td>Глухород натрий (содоидорный)</td>
<td></td>
<td>Sodium hypochlorite (dust/standard)</td>
<td>L</td>
<td>q³</td>
<td>119.07</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
STORAGE 19

General map of Nairit plant

Satellite view

Detailed position within the site

50% 50%

50% 50%

2 x 150 m²

4 x 800 m²

Pictures
Security conditions
<table>
<thead>
<tr>
<th>No.</th>
<th>Inventory number (Inventor number)</th>
<th>Chemical name (Chemical name)</th>
<th>CAS number</th>
<th>Level of purity</th>
<th>State (S, L, G)</th>
<th>Volume</th>
<th>Incompatibility Materials</th>
<th>Condition to Avoid</th>
</tr>
</thead>
<tbody>
<tr>
<td>128</td>
<td></td>
<td>NaCl solution + NaOH + NaHCO₃</td>
<td></td>
<td>L</td>
<td>liquid</td>
<td>3.472 m³</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
STORAGE 20

General map of Nairit plant

Satellite view

Detailed position within the site

Pictures
Security conditions

Majority of cylinders still contain a residual pressure of 0.5 bar of Chlorine
### Chemical characteristics table

<table>
<thead>
<tr>
<th>CAS number</th>
<th>Chemical name</th>
<th>Level of purity</th>
<th>State (S, L, G)</th>
<th>Melting point</th>
<th>Incompatibility Materials</th>
<th>Condition to Avoid</th>
</tr>
</thead>
<tbody>
<tr>
<td>7782-50-5</td>
<td>Chlorine</td>
<td>G</td>
<td>kr</td>
<td>600</td>
<td></td>
<td>Alcohols</td>
</tr>
</tbody>
</table>

High priority!
Toxic gas under pressure.
To be destroyed.
General map of Nairit plant

Detailed position within the site

Pictures
Security conditions
# Chemicals characteristics table

<table>
<thead>
<tr>
<th>№</th>
<th>Substances (inventory number)</th>
<th>Substance (Chemical name)</th>
<th>CAS number</th>
<th>Level of purity</th>
<th>State (S, L, G)</th>
<th>Symbol of usage</th>
<th>Rack size</th>
<th>Incompatibility Materials</th>
<th>Condition to Avoid</th>
</tr>
</thead>
<tbody>
<tr>
<td>66</td>
<td></td>
<td>Calcium acetate 60%</td>
<td>7487-68-0</td>
<td>60%</td>
<td>L</td>
<td>10 L</td>
<td>34.56</td>
<td>Barium, Potassium, Sodium, Ammonium, Ammoniacal, Hydrogen carbonate, Hydrogen peroxide, Acids, Alkalies, Hydrides, Hydrocarbons, Water, Air, Dust, Organic matter, Fluorides, Silica, Dust, Metallic salts, Iron, Sulphur, Hydrogen sulphide, Phosphorus pentoxide, Ozone.</td>
<td></td>
</tr>
<tr>
<td>127</td>
<td>Іятогацитат /Воден киселинен йод/</td>
<td>NaCl solution (with organic acid)</td>
<td>L</td>
<td>m³</td>
<td>300.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>128</td>
<td>Іятогацитат /Воден киселинен йод/</td>
<td>NaCl solution + NaOH + NH4OH</td>
<td>L</td>
<td>m³</td>
<td>3,472.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>129</td>
<td>Іятогацитат /Воден киселинен йод/</td>
<td>NaCl solution (with bicarbonate)</td>
<td>L</td>
<td>m³</td>
<td>2,215.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
STORAGE 22

General map of Nairit plant

Satellite view

Detailed position within the site

Pictures

showing the level of liquid in the tank

A little repair

Thermal picture
Security conditions

The tanker shows sign of corrosion and is not on a retention pool
# Chemicals characteristics table

<table>
<thead>
<tr>
<th>Nº</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th>Incompatibility Materials</th>
<th>Condition to Avoid</th>
</tr>
</thead>
<tbody>
<tr>
<td>65</td>
<td>2903200004</td>
<td>99%+</td>
<td>7854-83-0</td>
<td>Sulfuric acid</td>
<td>98%</td>
<td>L</td>
<td>Kg</td>
<td></td>
<td></td>
<td></td>
<td>Sulfur, Halides, Organic materials, Caustics, Solvents, Minerals, acids, Oxidizers, Oxidizing, diluted acids, Fire, water, peroxides, e.g. peracids, Peroxides, Peroxymonopersulfuric acid, Aces, Halogenated, Nitrogenates, phosphates, Caustic, oxidants, 90% Sulfuric acid, other chemicals, Halides, phosphorus, 90% acid, the local media</td>
<td></td>
</tr>
</tbody>
</table>

*Note: The table contains information about chemicals, their properties, and conditions to avoid.*
STORAGE 23

General map of Nairit plant

Satellite view

Detailed position within the site

3'200 m³

3'200 m³

50%

3'200 m³

Pictures
Security conditions
# Chemicals characteristics table

<table>
<thead>
<tr>
<th>No.</th>
<th>Code number (inventory number)</th>
<th>Name (Chemical name)</th>
<th>CAS number</th>
<th>Chemical name</th>
<th>Level of purity</th>
<th>State (S, L, G)</th>
<th>Solubility</th>
<th>Incompatibility Materials</th>
<th>Condition to Avoid</th>
</tr>
</thead>
<tbody>
<tr>
<td>127</td>
<td>Սաղարածի հոդված (Սաղարածի հոդված)</td>
<td>NaCl solution (with organic mixture)</td>
<td>L</td>
<td>m³</td>
<td>300.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>128</td>
<td>Սաղարածի հոդված (Սաղարածի հոդված)</td>
<td>NaCl solution + NaOH+ NaHCO₃</td>
<td>L</td>
<td>m³</td>
<td>3 472.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>129</td>
<td>Սաղարածի հոդված (Սաղարածի հոդված)</td>
<td>NaCl solution (with nickelates)</td>
<td>L</td>
<td>m³</td>
<td>2 216.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
General map of Nairit plant

Satellite view

Detailed position within the site

Pictures
### Security conditions

No retention pool.

Type of oil to be clearly identified.
### Chemicals characteristics table

<table>
<thead>
<tr>
<th>№</th>
<th>Chemical name (Ainset number)</th>
<th>Chemical name</th>
<th>Level of purity</th>
<th>State (G, L, G)</th>
<th>Incompatibility Materials</th>
<th>Condition to Avoid</th>
</tr>
</thead>
<tbody>
<tr>
<td>153</td>
<td>Трансформаторное масло (Transformer oil)</td>
<td>181576</td>
<td>L</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
STORAGE 25

General map of Nairit plant

Satellite view

Detailed position within the site

Pictures
Security conditions
## Chemical characteristics table

<table>
<thead>
<tr>
<th>No</th>
<th>Inventory number (CAS number)</th>
<th>Chemical name</th>
<th>Level of purity</th>
<th>State (S, L, G)</th>
<th>Oxidizable</th>
<th>Hydrolyses</th>
<th>Combustible</th>
<th>Photosensitive</th>
<th>Reactive</th>
<th>Incompatible Materials</th>
<th>Condition to Avoid</th>
</tr>
</thead>
<tbody>
<tr>
<td>107</td>
<td>1207501419 (14807-90-6)</td>
<td>Tartrazine S17</td>
<td>G</td>
<td>Kg</td>
<td>33,000.00</td>
<td>NH</td>
<td>NH</td>
<td>NH</td>
<td>NH</td>
<td>NH</td>
<td>NH</td>
</tr>
</tbody>
</table>
STORAGE 26

General map of Nairit plant

Satellite view

Detailed position within the site

Level 0

Pictures
## Chemicals characteristics table

<table>
<thead>
<tr>
<th>N°</th>
<th>Inventory number</th>
<th>Chemical name</th>
<th>CAS number</th>
<th>Level of purity</th>
<th>State (S, L, G)</th>
<th>Quantity</th>
<th>Incompatibility Materials</th>
<th>Condition to Avoid</th>
</tr>
</thead>
<tbody>
<tr>
<td>30</td>
<td>2800106500</td>
<td>Dodecyl mercaptan</td>
<td>112-55-0</td>
<td>S</td>
<td>Kg</td>
<td>2,363,000</td>
<td></td>
<td>Strong oxidizing agents</td>
</tr>
</tbody>
</table>
Detailed position within the site

Level 1
# Chemicals characteristics table

<table>
<thead>
<tr>
<th>№</th>
<th>Safety data sheet number</th>
<th>Identification  (Chemical name)</th>
<th>CAS number</th>
<th>Chemical name</th>
<th>Level of purity</th>
<th>State (S, L, Gp)</th>
<th>Tag liable disposal</th>
<th># of units</th>
<th>Storage location(s)</th>
<th>Container size</th>
<th>Total weight</th>
<th>Container conditions</th>
<th>Date of storage</th>
<th>Incompatible Materials</th>
<th>Condition to Avoid</th>
</tr>
</thead>
<tbody>
<tr>
<td>105</td>
<td>28000107003</td>
<td>Sulfur (alkanes)</td>
<td>108-88-3</td>
<td>Toluene</td>
<td>100%</td>
<td>L</td>
<td>Kg</td>
<td>36,000,000</td>
<td>261,1</td>
<td>200 L (barel)</td>
<td>3450</td>
<td>Good</td>
<td></td>
<td></td>
<td>Strong oxidizing agents</td>
</tr>
<tr>
<td>125</td>
<td>64-19-7</td>
<td>Acetic acid 30%</td>
<td></td>
<td>L</td>
<td>30%</td>
<td></td>
<td></td>
<td>200,1</td>
<td>Vertical tank</td>
<td>10,6 m³</td>
<td>Good</td>
<td>2010</td>
<td></td>
<td></td>
<td>Heat, flames and sparks</td>
</tr>
</tbody>
</table>
### Chemical characteristics table

<table>
<thead>
<tr>
<th>№</th>
<th>Substances (inventory number)</th>
<th>CAS number</th>
<th>Chemical name</th>
<th>Level of purity</th>
<th>State (S., L., G.)</th>
<th>Density/density (%)</th>
<th>Storage location(s)</th>
<th>Container type</th>
<th>Total Weight</th>
<th>Container conditions</th>
<th>Date of storage</th>
<th>Incompatibility (Materials)</th>
<th>Condition to Avoid</th>
</tr>
</thead>
<tbody>
<tr>
<td>41</td>
<td>2802954800</td>
<td>9004-08-04</td>
<td>Indium PW</td>
<td>S</td>
<td>Kg</td>
<td>48.598</td>
<td>28.2</td>
<td>1/2 Barrel</td>
<td>NH</td>
<td>NH</td>
<td>NH</td>
<td>NH</td>
<td>Reactivate with oxidizing agents; excess heat, incompatible materials</td>
</tr>
<tr>
<td>72</td>
<td>2802957200</td>
<td>86-36-5</td>
<td>Titanium diboride</td>
<td>S</td>
<td>Kg</td>
<td>36.435</td>
<td>28.2</td>
<td>40 Kg bag</td>
<td>1000</td>
<td>NH</td>
<td>NH</td>
<td>NH</td>
<td>Titanium tetraboride</td>
</tr>
<tr>
<td>81</td>
<td>2800150400</td>
<td>131-08-8</td>
<td>Silver sulf (sodium pyrosulfate)</td>
<td>S</td>
<td>Kg</td>
<td>556.4</td>
<td>28.2</td>
<td>25 kg Bag IF</td>
<td>750</td>
<td>NH</td>
<td>NH</td>
<td>NH</td>
<td>Silver pyrosulfate</td>
</tr>
<tr>
<td>85</td>
<td>2801400700</td>
<td>7792-03-7</td>
<td>Sodium sulfide technical</td>
<td>S</td>
<td>Kg</td>
<td>5740.0</td>
<td>28.2</td>
<td>50 L barrel-C</td>
<td>60</td>
<td>NH</td>
<td>NH</td>
<td>NH</td>
<td>Avoid. Strong oxidizing agents; exposure to air may affect product quality</td>
</tr>
</tbody>
</table>

All small packaging must be moved and groups in the main newly identified warehouse.
STORAGE 27

General map of Nairit plant

Satellite view

Detailed position within the site

Pictures

118

52
Security conditions
Door closed with padlock.
No ventilation.
High piled storage with damaged barrel.
No ground protection.
No fire protection.
No retention pool.
<table>
<thead>
<tr>
<th>No</th>
<th>Chemical Name</th>
<th>CAS Number</th>
<th>Chemical Name</th>
<th>Level of purity</th>
<th>Stain (L, S, G)</th>
<th>Durability (Usage)</th>
<th>Liquid, Container Size</th>
<th>Total Weight</th>
<th>Container conditions</th>
<th>Incompatibility Materials</th>
<th>Condition to Avoid</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>Hydrochloric acid</td>
<td>7647-01-0</td>
<td>Sulfuric acid</td>
<td>95%</td>
<td>L</td>
<td>Kg</td>
<td>25.00</td>
<td>Glass bottle</td>
<td>25.00</td>
<td>Good</td>
<td>Corrosive acid, water, reducing agents</td>
</tr>
<tr>
<td>15</td>
<td>Hydrogen peroxide</td>
<td>7722-84-1</td>
<td>Aniline</td>
<td>L</td>
<td>Kg</td>
<td>43.00</td>
<td>Bag</td>
<td>43.00</td>
<td>Sodium</td>
<td>Moisture sensitive</td>
<td>Corrosive to metals, can cause skin irritation</td>
</tr>
<tr>
<td>16</td>
<td>Hydrofluoric acid</td>
<td>7664-39-3</td>
<td>Acetic acid</td>
<td>S</td>
<td>Kg</td>
<td>2.500</td>
<td>Bag</td>
<td>2.500</td>
<td>Sodium</td>
<td>Corrosive to metals, can cause skin irritation</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>Hydrogen peroxide</td>
<td>7722-84-1</td>
<td>Hexamethylenediamine</td>
<td>L</td>
<td>Kg</td>
<td>175.00</td>
<td>Kg</td>
<td>175.00</td>
<td>Sodium</td>
<td>Corrosive to metals, can cause skin irritation</td>
<td></td>
</tr>
<tr>
<td>36</td>
<td>Hydrogen peroxide</td>
<td>7722-84-1</td>
<td>Ethyl acetate</td>
<td>L</td>
<td>Kg</td>
<td>193.00</td>
<td>Kg</td>
<td>193.00</td>
<td>Sodium</td>
<td>Corrosive to metals, can cause skin irritation</td>
<td></td>
</tr>
<tr>
<td>40</td>
<td>Hydrogen peroxide</td>
<td>7722-84-1</td>
<td>Sodium persulfate 75%</td>
<td>155-27-3</td>
<td>Kg</td>
<td>2.500</td>
<td>Kg</td>
<td>2.500</td>
<td>Sodium</td>
<td>Corrosive to metals, can cause skin irritation</td>
<td></td>
</tr>
<tr>
<td>44</td>
<td>Hydrogen peroxide</td>
<td>7722-84-1</td>
<td>Chlorinated paraffin grade CP-470</td>
<td>S</td>
<td>Kg</td>
<td>12,400</td>
<td>Kg</td>
<td>12,400</td>
<td>Sodium</td>
<td>Corrosive to metals, can cause skin irritation</td>
<td></td>
</tr>
<tr>
<td>45</td>
<td>Hydrogen peroxide</td>
<td>7722-84-1</td>
<td>Sulfuric acid</td>
<td>95%</td>
<td>L</td>
<td>Kg</td>
<td>37,800</td>
<td>Kg</td>
<td>37,800</td>
<td>Sodium</td>
<td>Corrosive to metals, can cause skin irritation</td>
</tr>
<tr>
<td>49</td>
<td>Hydrogen peroxide</td>
<td>7722-84-1</td>
<td>Potassium permanganate</td>
<td>S</td>
<td>Kg</td>
<td>4,300</td>
<td>Kg</td>
<td>4,300</td>
<td>Sodium</td>
<td>Corrosive to metals, can cause skin irritation</td>
<td></td>
</tr>
<tr>
<td>50</td>
<td>Hydrogen peroxide</td>
<td>7722-84-1</td>
<td>Potassium chloride</td>
<td>S</td>
<td>Kg</td>
<td>960.00</td>
<td>Kg</td>
<td>960.00</td>
<td>Sodium</td>
<td>Corrosive to metals, can cause skin irritation</td>
<td></td>
</tr>
<tr>
<td>52</td>
<td>Hydrogen peroxide</td>
<td>7722-84-1</td>
<td>Calcium hypochlorite</td>
<td>S</td>
<td>Kg</td>
<td>960.00</td>
<td>Kg</td>
<td>960.00</td>
<td>Sodium</td>
<td>Corrosive to metals, can cause skin irritation</td>
<td></td>
</tr>
<tr>
<td>55</td>
<td>Hydrogen peroxide</td>
<td>7722-84-1</td>
<td>Sodium hydroxide</td>
<td>S</td>
<td>Kg</td>
<td>960.00</td>
<td>Kg</td>
<td>960.00</td>
<td>Sodium</td>
<td>Corrosive to metals, can cause skin irritation</td>
<td></td>
</tr>
<tr>
<td>57</td>
<td>Hydrogen peroxide</td>
<td>7722-84-1</td>
<td>Sodium nitrate</td>
<td>S</td>
<td>Kg</td>
<td>960.00</td>
<td>Kg</td>
<td>960.00</td>
<td>Sodium</td>
<td>Corrosive to metals, can cause skin irritation</td>
<td></td>
</tr>
<tr>
<td>65</td>
<td>Hydrogen peroxide</td>
<td>7722-84-1</td>
<td>Sodium peroxide</td>
<td>S</td>
<td>Kg</td>
<td>960.00</td>
<td>Kg</td>
<td>960.00</td>
<td>Sodium</td>
<td>Corrosive to metals, can cause skin irritation</td>
<td></td>
</tr>
<tr>
<td>66</td>
<td>Hydrogen peroxide</td>
<td>7722-84-1</td>
<td>Magnesium</td>
<td>L</td>
<td>Kg</td>
<td>700.00</td>
<td>Kg</td>
<td>700.00</td>
<td>Sodium</td>
<td>Corrosive to metals, can cause skin irritation</td>
<td></td>
</tr>
<tr>
<td>67</td>
<td>Hydrogen peroxide</td>
<td>7722-84-1</td>
<td>Copper chloride</td>
<td>S</td>
<td>Kg</td>
<td>950.00</td>
<td>Kg</td>
<td>950.00</td>
<td>Sodium</td>
<td>Corrosive to metals, can cause skin irritation</td>
<td></td>
</tr>
<tr>
<td>69</td>
<td>Hydrogen peroxide</td>
<td>7722-84-1</td>
<td>Methyl methacrylate</td>
<td>S</td>
<td>Kg</td>
<td>2,900</td>
<td>Kg</td>
<td>2,900</td>
<td>Sodium</td>
<td>Corrosive to metals, can cause skin irritation</td>
<td></td>
</tr>
<tr>
<td>No.</td>
<td>CAS Number</td>
<td>Chemical Name</td>
<td>CAS number</td>
<td>Chemical name</td>
<td>Level of</td>
<td>Store</td>
<td>Container size</td>
<td>Container conditions</td>
<td>Incompatibility Materials</td>
<td>Condition to Avoid</td>
<td></td>
</tr>
<tr>
<td>-----</td>
<td>------------</td>
<td>---------------</td>
<td>------------</td>
<td>---------------</td>
<td>----------</td>
<td>-------</td>
<td>----------------</td>
<td>-----------------------</td>
<td>------------------------</td>
<td>---------------------</td>
<td></td>
</tr>
<tr>
<td>76</td>
<td>2599100000</td>
<td>Urea</td>
<td>57-13-0</td>
<td>Methyl pyroldine</td>
<td>S</td>
<td>Kg</td>
<td>5,000.00 Kg</td>
<td>Kg</td>
<td>5,000.00 Kg</td>
<td>Strong oxidizing agents, strong reducing agents</td>
<td></td>
</tr>
<tr>
<td>77</td>
<td>2599152400</td>
<td>Urea</td>
<td>57-13-0</td>
<td>Nitroso-di-p-nitrophenol</td>
<td>S</td>
<td>Kg</td>
<td>26.223.00 Kg</td>
<td>Kg</td>
<td>26.223.00 Kg</td>
<td>Strong oxidizing agents</td>
<td></td>
</tr>
<tr>
<td>85</td>
<td>2597457000</td>
<td>Urea</td>
<td>57-13-0</td>
<td>Sodiun polychlorophenol</td>
<td>S</td>
<td>Kg</td>
<td>18,000.00 Kg</td>
<td>Kg</td>
<td>18,000.00 Kg</td>
<td>Strong oxidizing agents, for organo products, exposure to moist air is also</td>
<td></td>
</tr>
<tr>
<td>105</td>
<td>2590102800</td>
<td>Urea</td>
<td>57-13-0</td>
<td>2,4-Dinitrophenol</td>
<td>S</td>
<td>Kg</td>
<td>22,500.00 Kg</td>
<td>Kg</td>
<td>22,500.00 Kg</td>
<td>Strong oxidizing agents</td>
<td></td>
</tr>
<tr>
<td>110</td>
<td>2596103200</td>
<td>Nitrile</td>
<td>57-77-8</td>
<td>tires</td>
<td>S</td>
<td>Kg</td>
<td>16,000.00 Kg</td>
<td>Kg</td>
<td>16,000.00 Kg</td>
<td>Strong oxidizing agents</td>
<td></td>
</tr>
<tr>
<td>115</td>
<td>2596103300</td>
<td>Identif</td>
<td>131-83-1</td>
<td>Zinc</td>
<td>S</td>
<td>Kg</td>
<td>840.00 Kg</td>
<td>Kg</td>
<td>840.00 Kg</td>
<td>NH NH NH NH NH NH NH</td>
<td>Strong oxidizing agents, strong reducing agents, strong oxidizing agents</td>
</tr>
<tr>
<td>118</td>
<td>2590118800</td>
<td>Dicyan</td>
<td>144-47-7</td>
<td>Dicyan</td>
<td>Kg</td>
<td>1,000.00 Kg</td>
<td>Kg</td>
<td>1,000.00 Kg</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
STORAGE 28 level 0

General map of Nairit plant

Satellite view

Detailed position within the site

Pictures
Security conditions

Chemicals, like rubber waste, are stored without any protection releasing corrosive vapours.

No ventilation

Corroded argon bottle under pressure.
## Chemicals characteristics table

<table>
<thead>
<tr>
<th>N°</th>
<th>Gudhquqiq (inventory number)</th>
<th>Ubqala/na (Chemical name)</th>
<th>CAS number</th>
<th>Chemical name</th>
<th>Level of purity</th>
<th>State (S, L, G)</th>
<th>Outline/dfiwnyjn</th>
<th>#/wfn</th>
<th>Container size</th>
<th>Total Weight</th>
<th>Container conditions</th>
<th>Incompatibility Materials</th>
<th>Condition to Avoid</th>
</tr>
</thead>
<tbody>
<tr>
<td>27</td>
<td>26000101500</td>
<td>Ditabok</td>
<td></td>
<td>Kg</td>
<td>470.00</td>
<td>200 L basket</td>
<td>470.00</td>
<td>EAD</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>72</td>
<td>25000400700</td>
<td>Haiite KL-10</td>
<td></td>
<td>Kg</td>
<td>2,000.00</td>
<td>2,000.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>107</td>
<td>1207501410</td>
<td>Tale powder TRUP</td>
<td>14007-96-6</td>
<td>Kg</td>
<td>33,800.00</td>
<td>20 kg bag</td>
<td>50.00</td>
<td>NH</td>
<td>NH</td>
<td>NH</td>
<td>NH</td>
<td>NH</td>
<td>NH</td>
</tr>
<tr>
<td></td>
<td>Argon</td>
<td></td>
<td></td>
<td>Kg</td>
<td>50 kg pressure</td>
<td>Medium</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*NH: Nitrogen, *ND: Non-Desired
STORAGE 28 Level 1 – Part 1

Detailed position within the site

Pictures
# Chemicals Characteristics Table

<table>
<thead>
<tr>
<th>No.</th>
<th>Work/Cas/In (Inventory number)</th>
<th>Unique/Iron (Chemical name)</th>
<th>CAS number</th>
<th>Chemical name</th>
<th>Level of purity</th>
<th>State (L, S)</th>
<th>Total Weight</th>
<th>Accidents or conditions</th>
<th>Condition to Avoid</th>
<th>Incompatibility Materials</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2600100230</td>
<td>4-(1H-Pyrazol-4-yl)-2-fluorobenzonitrile</td>
<td>136-37-0</td>
<td>4-methyl-2,6-di-tert-</td>
<td>S</td>
<td>Kg</td>
<td>225.00</td>
<td>Good</td>
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<td></td>
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<tr>
<td>2</td>
<td>2600100501</td>
<td>1,10-Phenanthroline</td>
<td>1204-03-3</td>
<td>1,10-Phenanthroline</td>
<td>S</td>
<td>Kg</td>
<td>2,000.00</td>
<td>Good</td>
<td></td>
<td></td>
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<tr>
<td>3</td>
<td>2600114000</td>
<td>Akali</td>
<td>2,433-80-8</td>
<td>Akali</td>
<td>Kg</td>
<td>2,785.00</td>
<td>Medium</td>
<td>NH</td>
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<tr>
<td>4</td>
<td>2600100720</td>
<td>Anthraquinone</td>
<td>22-48-6</td>
<td>Anthraquinone</td>
<td>Kg</td>
<td>4,900.00</td>
<td>30 kg bags</td>
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<tr>
<td>5</td>
<td>2600100120</td>
<td>Lignine</td>
<td>68-64-1</td>
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<td>Kg</td>
<td>90.00</td>
<td>40.00</td>
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<td>6</td>
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<td>Selenium dioxide</td>
<td>1223-71-8</td>
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<td>25 kg bags</td>
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<td>Sodium hydroxide</td>
<td>135-05-0</td>
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<td>Kg</td>
<td>1,550.00</td>
<td>50 L barrel</td>
<td>150.00</td>
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<td>8</td>
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<td>Indium (P2)</td>
<td>9641-09-4</td>
<td>Indium (P2)</td>
<td>Kg</td>
<td>46,990.00</td>
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<td>9</td>
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<td>Zinc</td>
<td>178-01-3</td>
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<td>50 L barrels</td>
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<td>2600102000</td>
<td>Potassium chlorate (red</td>
<td>137-56-2</td>
<td>Potassium chlorate (red</td>
<td>Kg</td>
<td>4,339.00</td>
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<tr>
<td>11</td>
<td>2600103000</td>
<td>Sodium</td>
<td>148-25-0</td>
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<td>Kg</td>
<td>20,000.00</td>
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<td>12</td>
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<td>Calcium</td>
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<td>Kg</td>
<td>7,500.00</td>
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<td>2600105000</td>
<td>Copper</td>
<td>7758-92-7</td>
<td>Copper</td>
<td>Kg</td>
<td>2,092.00</td>
<td>30 L barrel</td>
<td>200.00</td>
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<tr>
<td>14</td>
<td>2600106000</td>
<td>Copper (Copper sulfate)</td>
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<td>Copper (Copper sulfate)</td>
<td>Kg</td>
<td>344.30</td>
<td>300.00</td>
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<tr>
<td>15</td>
<td>2600107000</td>
<td>Copper (Copper acetate)</td>
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<td>Copper (Copper acetate)</td>
<td>Kg</td>
<td>2,092.20</td>
<td>225.00</td>
<td>225.00</td>
<td>Good</td>
<td></td>
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</tbody>
</table>

- **Incompatibility Materials**: Acetic acid, Acetic anhydride, Chlorinating agents, Nitric acid, Nitrogen oxides, - Exposure to moisture, Air exposure to moisture.
- **Condition to Avoid**: Strong oxidizing agents, Strong reducing agents, Air Light, Weak acid and alkali, - Exposure to moisture, Air exposure to moisture.
| No. | Description (quantity/number) | U.N. No. (Chemical name) | CAS Number | Chemical name | Level of purity | State (S, L, D) | Suitable handling | Unsuitable handling | Container size | Total Weight | Container condition | Incompatibility Materials | Condition to Avoid |
|-----|-------------------------------|--------------------------|------------|---------------|----------------|----------------|------------------|------------------|----------------|--------------|----------------|------------------|---------------------|------------------|
| 77  | 2601-1400000 | Lactate buffers | 7831-99-4 | Sodium acetate, NaHCO3 | S, Kg | 18,663.00 | 30 kg bags | 14,950.00 | Good | | | Strong acids, Strong reducing agents, Peroxidizing agents, Organic materials, Alkali metals, Alcohol, saliva |
| 78  | 2600102460 | Lactate, 30% solution | 86-30-6 | Sodium acetate | S, Kg | 22,323.00 | 30 kg bags | 6,960.00 | Good | | | Strong acids, Strong reducing agents |
| 58  | 9600100000 | Pesticides | 11660-90-7 | Dimethoate | L, Kg | 1,481.25 | 100 kg bag | 1,481.25 | Good | | | Strong acids, Strong reducing agents, Peroxidizing agents, Organic materials, Alcohol, saliva |
| 97  | 2600118000 | Urea | 151-25-3 | Sodium methy sulfonate | L | 700 L barrel | 32.00 | Good | | | | |
| 59  | 2600100700 | Chemicals for inorganic and organic synthesis | 7787-83-7 | Sodium sulfide technical | S, Kg | 8,748.00 | 30 kg bags | 8,748.00 | Good | | | Acids, Strong oxidizing agents |
| 101 | 2600300010 | Lithium hydroxide | 64-57-8 | Ethanol | L | 10.00 | Glass bottles | 3.20 | Medium | | | Alkali metals, Strong oxidizing agents, Strong reducing agents, Heat, flames and sparks |
| 105 | 2600112200 | Urea | L, Kg | Sodium | 100.00 | Glass bottles | 3.20 | Medium | | | | |
| 107 | 2600106800 | Urea | 555-63-1 | Sodium | S, Kg | 3,784.40 | Big bag | 1,200.00 | Medium | | | Calcium oxide, Strong oxidizing agents, Strong reducing agents |
| 108 | 2600106900 | Urea | 137-15-6 | Tetrazine | S, Kg | 2,730.90 | 30 kg bag | 2,400.00 | Good | | | Strong acids, Strong reducing agents |
| 110 | 2600103000 | Urea | 97-77-8 | Tetrazine | S, Kg | 16,839.25 | 25 kg bags | 1,125.00 | Good | | | Strong acids, Strong reducing agents |
| 111 | 2600118200 | Urea | 89-29-3 | Tetrazine | S, Kg | 1,300.00 | 50 kg bag | 1,300.00 | Good | | | Strong acids, Strong reducing agents |
| 112 | 2600100000 | Urea | 7558-29-4 | Sodium tripolyphosphate | S | Big bag | 420.00 | Medium | NH, NH | NH | NH | NH | NH | NH | NH | NH | NH | NH | NH | NH | NH | NH |
| 113 | 2600101000 | Urea | 1333-33-9 | Manganese oxide | S, Kg | 4,783.90 | 30 kg bags | 840.00 | Good | | | Strong acids, Strong oxidizing agents, Peroxidizing agents |
| 122 | 1300300000 | Magnesium oxide | S | Sodium | S, Kg | 4,600.00 | 30 kg bags | 30.00 | Bad | | | | |
| 123 | 2600100000 | Magnesium oxide | S | Sodium carbonate | S | 4,600.00 | Bag | 30.00 | Bad | | | | |
| 124 | 2600100000 | Magnesium oxide | S | Sodium sulfate | S | 4,600.00 | Bag | 30.00 | Bad | | | | | |
STORAGE 28 – Level 1 – Part 2

Detailed position within the site

Pictures
## Chemicals characteristics table

<table>
<thead>
<tr>
<th>No</th>
<th>Chemical Substance</th>
<th>CAS No.</th>
<th>Chemical Name</th>
<th>Level of Purity</th>
<th>State (S, L, G)</th>
<th>Quantity</th>
<th>Container Size</th>
<th>Total Weight</th>
<th>Container Condition</th>
<th>Incompatibility Materials</th>
<th>Condition to Avoid</th>
</tr>
</thead>
<tbody>
<tr>
<td>21</td>
<td>Cumene hydroperoxide</td>
<td>95-15-8</td>
<td>L Kg</td>
<td>40.00</td>
<td>201 barrel</td>
<td>40.00</td>
<td>medium</td>
<td></td>
<td></td>
<td>Poor denit metals, Organic materials, Heavy metal salts, metal nitrates</td>
<td>-</td>
</tr>
<tr>
<td>30</td>
<td>Dodecyl mercaptan</td>
<td>112-05-0</td>
<td>S Kg</td>
<td>2.363.00</td>
<td>200 L barrel</td>
<td>2.363.000</td>
<td></td>
<td></td>
<td>Strong oxidizing agents</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>60</td>
<td>Acetic acid</td>
<td>64-19-7</td>
<td>L Kg</td>
<td>16,666.00</td>
<td>20 L barrel</td>
<td>40.00</td>
<td>good</td>
<td></td>
<td></td>
<td>Incompatible materials: Oxidizing agents, Strong acids, Strong oxidizing agents</td>
<td>Heat, flames and sparks.</td>
</tr>
<tr>
<td>64</td>
<td>OH PMS-200</td>
<td>5006-65-9</td>
<td>L Kg</td>
<td>1,556.00</td>
<td>200 L barrel</td>
<td>1,314.00</td>
<td>Good</td>
<td></td>
<td></td>
<td>Strong oxidizing agents; Strong oxidation agents, strong bases</td>
<td>-</td>
</tr>
<tr>
<td>66</td>
<td>Morpholine</td>
<td>110-91-8</td>
<td>L Kg</td>
<td>700.00</td>
<td>200 L barrel</td>
<td>709.00</td>
<td>Good</td>
<td></td>
<td></td>
<td>Strong oxidizing agents; Strong acids, Strong oxidizing agents, Poor denit metals, Organic materials</td>
<td>Heat, flames and sparks.</td>
</tr>
<tr>
<td>77</td>
<td>Sodium nitrite, NaNO2</td>
<td>7651-09-4</td>
<td>S Kg</td>
<td>16,560.00</td>
<td>20 kg bag</td>
<td>3,600.00</td>
<td>Good</td>
<td></td>
<td></td>
<td>Strong oxidizing agents; Oxidizing agents, Oxidizing agents, Strong oxidizing agents</td>
<td>Strong oxidizing agents</td>
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<tr>
<td>78</td>
<td>Nitroso- diphosphazene</td>
<td>96-30-4</td>
<td>S Kg</td>
<td>26,223.00</td>
<td>30 kg bag</td>
<td>6,000.00</td>
<td>Good</td>
<td></td>
<td></td>
<td>Strong oxidizing agents; Strong acids, Strong oxidizing agents, Poor denit metals</td>
<td>Heat, flames and gases.</td>
</tr>
<tr>
<td>90</td>
<td>Instant sulfur</td>
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<td>Kg</td>
<td>17.00</td>
<td>40 L barrel</td>
<td>50.00</td>
<td>BAD</td>
<td></td>
<td></td>
<td>Strong oxidizing agents; Strong oxidizing agents, Strong acids</td>
<td>-</td>
</tr>
<tr>
<td>91</td>
<td>131-04-8</td>
<td></td>
<td>Kg</td>
<td>566.40</td>
<td>GRV</td>
<td>4,540.00</td>
<td>Good</td>
<td>NH</td>
<td>NH</td>
<td>NH</td>
<td>NH</td>
</tr>
<tr>
<td>98</td>
<td>Ethyleneimine</td>
<td>122-39-4</td>
<td>Kg</td>
<td>580.00</td>
<td>L glass bot</td>
<td>4.00</td>
<td>good</td>
<td></td>
<td></td>
<td>Reactive with oxidizing agents; Reactive with oxidizing agents, Incompatible materials, light, air</td>
<td>-</td>
</tr>
<tr>
<td>103</td>
<td>Sterol</td>
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<td>L Kg</td>
<td>105.00</td>
<td>30 kg bag</td>
<td>2,850.00</td>
<td>good</td>
<td></td>
<td></td>
<td>Reactive with oxidizing agents; Oxidizing agents, Oxidizer, Organic materials</td>
<td>-</td>
</tr>
<tr>
<td>104</td>
<td>555-43-1</td>
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<td>S Kg</td>
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<td>2,758.96</td>
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<td></td>
<td></td>
<td>Reactive with oxidizing agents</td>
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<tr>
<td>108</td>
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<td>22,850.00</td>
<td>200 L barrel</td>
<td>100.00</td>
<td>Bad</td>
<td></td>
<td></td>
<td>Strong oxidizing agents; Strong oxidizing agents</td>
<td>-</td>
</tr>
</tbody>
</table>

### Priority actions to undertake:

- **Repacking 95**: violent reaction with water
- **Isolating 77**: Oxidizer
STORAGE 29 – LEVEL 0

General map of Nairit plant

Satellite view

Detailed position within the site
Pictures

Security conditions

Structure: All concrete, and a metallic door

Security conditions: Main door closed with a padlock with key. Large opens on outdoor with no protection against the rain and humidity.
<table>
<thead>
<tr>
<th>No.</th>
<th>CAS number</th>
<th>Chemical name</th>
<th>Level of purity</th>
<th>State (S, L, G)</th>
<th>Outside/Inside</th>
<th>Buildup</th>
<th>Storage location(s)</th>
<th>Container size</th>
<th>Total Weight</th>
<th>Container conditions</th>
<th>Incompatibility Materials</th>
<th>Condition to Avoid</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>3000111000</td>
<td>Sodium hydroxide</td>
<td>S, K</td>
<td>Barrel</td>
<td>127</td>
<td>Open</td>
<td>Strong acids, Strong bases, Strong reducing agents, Strong oxidizing agents</td>
<td>Ammoniacal</td>
<td></td>
<td></td>
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<tr>
<td>6</td>
<td>3000112000</td>
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<td>S, K</td>
<td>Barrel</td>
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<td>Open</td>
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<td>Ammoniacal</td>
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<td>29.6-4</td>
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<td>29.0-5</td>
<td>10 kg bags</td>
<td>2400</td>
<td>Good</td>
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<tr>
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<td>3,000.00</td>
<td>29.0-5</td>
<td>10 kg bags</td>
<td>2400</td>
<td>Good</td>
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<td>10 kg bags</td>
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<td>10 kg bags</td>
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<td>65</td>
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<td>S, K</td>
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<td>29.0-5</td>
<td>10 kg bags</td>
<td>2400</td>
<td>Good</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>66</td>
<td>3000100000</td>
<td>Hydrochloric acid</td>
<td>S, K</td>
<td>3,000.00</td>
<td>29.0-5</td>
<td>10 kg bags</td>
<td>2400</td>
<td>Good</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Note: The table includes various chemicals and their properties, along with their handling and safety considerations.*
<table>
<thead>
<tr>
<th>No.</th>
<th>UN Number</th>
<th>Final Product</th>
<th>Quantity</th>
<th>Storage Location</th>
<th>Container</th>
<th>CAS Number</th>
<th>Description</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>300105/000</td>
<td>Sodium nitrate</td>
<td>25.0 kg</td>
<td>300 L barrel</td>
<td>Good</td>
<td>7759-15-6</td>
<td>Sodium nitrate</td>
<td>None</td>
</tr>
</tbody>
</table>

Priority actions to undertake:
Isolating the oxidizers: (19, 77)
STORAGE 29 – LEVEL 2

Detailed position within the site

Pictures

Structure: All concrete, and a metallic door
Security conditions: Main door closed with a padlock with key
Security conditions

Structure: All concrete, and a metallic door

Security conditions: Main door closed with a padlock with key. Large opens on outdoor with no protection against the rain and humidity.
# Chemicals characteristics table

<table>
<thead>
<tr>
<th>No.</th>
<th>Substance (inventory number)</th>
<th>UN number</th>
<th>Chemical name</th>
<th>Level of purity</th>
<th>State (S, L, G)</th>
<th>Density (kg/m³)</th>
<th>Activity</th>
<th>Storage location(s)</th>
<th>Container size</th>
<th>Total Weight</th>
<th>Container conditions</th>
<th>Date of storage</th>
<th>Incompatibility Materials</th>
<th>Condition to Avoid</th>
</tr>
</thead>
<tbody>
<tr>
<td>25</td>
<td>25001906000</td>
<td>107-46-2</td>
<td>Dichloromethane</td>
<td>L</td>
<td>Kg</td>
<td>789.50</td>
<td></td>
<td>200 l, 1 Barrel</td>
<td>650</td>
<td>Good</td>
<td></td>
<td></td>
<td></td>
<td>Strong oxidizing agents: Heat, flares and sparks; Oxidation of temperature and direct sunlight</td>
</tr>
<tr>
<td>26</td>
<td>25018010150</td>
<td></td>
<td>Disperser NFK</td>
<td>L</td>
<td>Kg</td>
<td>608.00</td>
<td></td>
<td>200 l, 1 Barrel</td>
<td>789</td>
<td>Good</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>32</td>
<td>25001906000</td>
<td>703-24-8</td>
<td>Butane</td>
<td>S</td>
<td>Kg</td>
<td>125.00</td>
<td></td>
<td>25 kg bags</td>
<td>2500</td>
<td>Good</td>
<td></td>
<td></td>
<td></td>
<td>Reaches with strong acids and oxidizing agents. No further robust available. Keep in a cool location. Protect from humidity and water. Store storage area extreme heat, flammable or open flame.</td>
</tr>
<tr>
<td>55</td>
<td>2500113300</td>
<td>110-91-8</td>
<td>Meprobamate</td>
<td>L</td>
<td>Kg</td>
<td>700.00</td>
<td></td>
<td>200 l, 1 Barrel</td>
<td>780</td>
<td>Medium</td>
<td></td>
<td></td>
<td></td>
<td>Strong oxidizing agents: Heat, flares and sparks</td>
</tr>
<tr>
<td>115</td>
<td>25001907300</td>
<td>57-77-8</td>
<td>Terbium E</td>
<td>N</td>
<td>Kg</td>
<td>16,039.00</td>
<td></td>
<td>25 kg bags</td>
<td>3200</td>
<td>Medium</td>
<td></td>
<td></td>
<td></td>
<td>Strong oxidizing agents: Heat, flares and sparks</td>
</tr>
<tr>
<td>110</td>
<td>25001906500</td>
<td></td>
<td>Stronghold 17%</td>
<td>S</td>
<td>Kg</td>
<td>226.00</td>
<td></td>
<td>25 kg bags</td>
<td>500</td>
<td>Good</td>
<td></td>
<td></td>
<td></td>
<td>Strong oxidizing agents: Heat, flares and sparks</td>
</tr>
<tr>
<td>135</td>
<td>140296100</td>
<td></td>
<td>Tornado UP 06-3334</td>
<td>L</td>
<td>Kg</td>
<td>290.00</td>
<td></td>
<td>250 l, 1 Barrel</td>
<td>350</td>
<td>Bad</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Waste
STORAGE 30

General map of Nairit plant  
Satellite view

Detailed position within the building

Pictures

Security conditions
Part of the solution is crystallised
### Chemical characteristics table

<table>
<thead>
<tr>
<th>№</th>
<th>Inventory number</th>
<th>Chemical name</th>
<th>Level of purity</th>
<th>State (P, L, G)</th>
<th>Inflammability</th>
<th>Reactivity</th>
<th>Corrosion</th>
<th>Incompatibility Materials</th>
<th>Condition to Avoid</th>
</tr>
</thead>
<tbody>
<tr>
<td>51</td>
<td>2301600100</td>
<td>Calcium chloride (31-33%)</td>
<td>31-33% solution</td>
<td>L</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Sweep extinguishing agents</td>
</tr>
</tbody>
</table>
STORAGE 31

General map of Nairit plant

Satellite view

Detailed position within the building

Pictures

Security conditions
### Chemicals characteristics table

<table>
<thead>
<tr>
<th>№</th>
<th>Inventory number (CAS number)</th>
<th>Chemical name (State)</th>
<th>Level of purity</th>
<th>State (S, L, G)</th>
<th>Incompatibility Materials</th>
<th>Condition to Avoid</th>
</tr>
</thead>
<tbody>
<tr>
<td>52</td>
<td>2000860400 8502-10-6</td>
<td>Rosin disproportional</td>
<td>S</td>
<td>Kg</td>
<td></td>
<td>?</td>
</tr>
</tbody>
</table>
STORAGE 32

General map of Nairit plant

Satellite view

Detailed position within the building

Pictures

Security conditions
### Chemicals characteristics table

<table>
<thead>
<tr>
<th>№</th>
<th>Chemical name</th>
<th>Level of purity</th>
<th>State (S, L, G)</th>
<th>Weight in Stock</th>
<th>Incompatibility Materials</th>
<th>Condition to Avoid</th>
</tr>
</thead>
<tbody>
<tr>
<td>154</td>
<td>Magnesium</td>
<td>Different oils</td>
<td>L</td>
<td>8300.0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Storage mobile

Hypochlorite wagons

General map of Nairit plant

Satellite view

Detailed position within the building

Pictures

Security conditions

Poor conditions for a thermal sensitive product
<table>
<thead>
<tr>
<th>Nº</th>
<th>Chemical Name (Inventory number)</th>
<th>CAS number</th>
<th>Chemical name</th>
<th>Level of purity</th>
<th>State (s, l, g)</th>
<th>Quantity/Weight Unit</th>
<th>Quantity/Weight</th>
<th>Incompatibility Materials</th>
<th>Condition to Avoid</th>
</tr>
</thead>
<tbody>
<tr>
<td>143</td>
<td>Патлеворшук (попноршуконий)</td>
<td>7681-52-9</td>
<td>Sodium hypochlorite (substantive)</td>
<td>low</td>
<td>m³</td>
<td>1191</td>
<td></td>
<td>Contact with acids liberates toxic gas</td>
<td></td>
</tr>
</tbody>
</table>
STORAGE 33

General map of Nairit plant

Satellite view

Detailed position within the building

Pictures

Security conditions
### Chemicals characteristics table

<table>
<thead>
<tr>
<th>№</th>
<th>Chemical name</th>
<th>Level of purity</th>
<th>State (S, L, G)</th>
<th>Unit density (kg/m³)</th>
<th>Incompatibility Materials</th>
<th>Condition to Avoid</th>
</tr>
</thead>
<tbody>
<tr>
<td>154</td>
<td>Macca parvum</td>
<td>Different oils</td>
<td>L</td>
<td>4.3000</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
STORAGE 34

General map of Nairit plant

Satellite view

Detailed position within the building

Pictures

Security conditions
## Chemicals characteristics table

<table>
<thead>
<tr>
<th>№</th>
<th>Chemical name</th>
<th>Level of purity</th>
<th>CAS number</th>
<th>Level of purity</th>
<th>State (S, L, G)</th>
<th>Unit</th>
<th>Mass/weight</th>
<th>vol</th>
<th>Incompatibility Materials</th>
<th>Condition to Avoid</th>
</tr>
</thead>
<tbody>
<tr>
<td>154</td>
<td>Масла разные</td>
<td>L</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>576.0</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
ANNEX 6

Compilation of MSDS related to the identified chemicals

Note:

The presented MSDS were not available at Nairit Chemical Plant and have therefore been compiled from other sources and are as accurate as possible.

Not all MSDS have been found.

Some chemical do not have MSDS.
Annex  8

Compilation of the MSDS related to the identified chemicals

Note:

The presented MSDS were not available at Nairit Chemical Plant and have therefore been compiled from other sources and are as accurate as possible

Not all MSDS have been found

Some chemical do not have MSDS
<table>
<thead>
<tr>
<th>No.</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2,6-Di-tert-butyl-4-methylphenol</td>
</tr>
<tr>
<td>3</td>
<td>Aluminium sulfate</td>
</tr>
<tr>
<td>4</td>
<td>Ammonium chloride</td>
</tr>
<tr>
<td>5</td>
<td>Phthalic anhydride</td>
</tr>
<tr>
<td>6</td>
<td>Aniline</td>
</tr>
<tr>
<td>8</td>
<td>2,4,6-Tri-tert-buthylphenol</td>
</tr>
<tr>
<td>9</td>
<td>Lowinox 22M46</td>
</tr>
<tr>
<td>10</td>
<td>Acetone</td>
</tr>
<tr>
<td>11</td>
<td>Nitric acid</td>
</tr>
<tr>
<td>12</td>
<td>Ammonia</td>
</tr>
<tr>
<td>13</td>
<td>Hydrochloric acid</td>
</tr>
<tr>
<td>14</td>
<td>Sodium dichromate</td>
</tr>
<tr>
<td>15</td>
<td>Boric acid</td>
</tr>
<tr>
<td>16</td>
<td>Ethylene glycol butyl ether - butyl_cellosolve</td>
</tr>
<tr>
<td>17</td>
<td>Sodium tetraborate decahydrate - sodium borate</td>
</tr>
<tr>
<td>18</td>
<td>Hexamethylenediamine</td>
</tr>
<tr>
<td>20</td>
<td>Hydroquinone</td>
</tr>
<tr>
<td>21</td>
<td>Cumene Hydroperoxide</td>
</tr>
<tr>
<td>22</td>
<td>Dibutyl Phthalate</td>
</tr>
<tr>
<td>23</td>
<td>Diethanolamine</td>
</tr>
<tr>
<td>24</td>
<td>Diisobutylene</td>
</tr>
<tr>
<td>25</td>
<td>1,2-Dichloroethane</td>
</tr>
<tr>
<td>28</td>
<td>2,5-Di-tert-butylhydroquinone</td>
</tr>
<tr>
<td>29</td>
<td>1,3-Diphenylguanidine</td>
</tr>
<tr>
<td>30-31</td>
<td>tert-Dodecylmercaptan</td>
</tr>
<tr>
<td>32</td>
<td>Dusantox 6PPD</td>
</tr>
<tr>
<td>34</td>
<td>Ethylene thiourea</td>
</tr>
<tr>
<td>35</td>
<td>Epoxy resin example</td>
</tr>
<tr>
<td>36</td>
<td>Ethyl acetate</td>
</tr>
<tr>
<td>37</td>
<td>Ethylene glycol dimethacrylate</td>
</tr>
<tr>
<td>38</td>
<td>Ethylene glycol</td>
</tr>
<tr>
<td>40</td>
<td>Sodium dodecyl sulfate</td>
</tr>
<tr>
<td>41</td>
<td>Lomar PW</td>
</tr>
<tr>
<td></td>
<td>Name</td>
</tr>
<tr>
<td>---</td>
<td>----------------------------------------------</td>
</tr>
<tr>
<td>42</td>
<td>Lovenox-Sodium 2-naphtalenesulfonate</td>
</tr>
<tr>
<td>43</td>
<td>Chloroform</td>
</tr>
<tr>
<td>44</td>
<td>Chloroparafin</td>
</tr>
<tr>
<td>45</td>
<td>Sulfuric acid 96%</td>
</tr>
<tr>
<td>46</td>
<td>Sulfuric acid 78% used</td>
</tr>
<tr>
<td>47</td>
<td>Sulfuric acid 84% used</td>
</tr>
<tr>
<td>49</td>
<td>Potassium hexacyanoferrate(III)</td>
</tr>
<tr>
<td>50</td>
<td>Potassium chloride</td>
</tr>
<tr>
<td>51</td>
<td>Calcium chloride solution</td>
</tr>
<tr>
<td>53</td>
<td>Gum rosin</td>
</tr>
<tr>
<td>55</td>
<td>Butadiene rubber SKD</td>
</tr>
<tr>
<td>56</td>
<td>Rubber SMR-20</td>
</tr>
<tr>
<td>57</td>
<td>2-Mercaptobenzothiazole</td>
</tr>
<tr>
<td>59</td>
<td>Calcium carbide</td>
</tr>
<tr>
<td>60</td>
<td>Acetic acid 100%</td>
</tr>
<tr>
<td>61</td>
<td>Polycrillamide</td>
</tr>
<tr>
<td>63</td>
<td>Lead(II) chromate</td>
</tr>
<tr>
<td>64</td>
<td>Oil PMS-200 Dimethicone</td>
</tr>
<tr>
<td>66</td>
<td>Morpholine</td>
</tr>
<tr>
<td>67</td>
<td>Copper(I) chloride</td>
</tr>
<tr>
<td>68</td>
<td>Copper(II) sulfate pentahydrate</td>
</tr>
<tr>
<td>69</td>
<td>Methyl methacrylate</td>
</tr>
<tr>
<td>70</td>
<td>1-Methyl-2-pyrrolidone</td>
</tr>
<tr>
<td>71</td>
<td>Carbon</td>
</tr>
<tr>
<td>72</td>
<td>Sodium hexafluorosilicate</td>
</tr>
<tr>
<td>73</td>
<td>Sodium thiosulfate</td>
</tr>
<tr>
<td>75</td>
<td>Neozone N-Phenyl-1-naphthylamine</td>
</tr>
<tr>
<td>76</td>
<td>Neozone D N-Phenyl-2-naphthylamine</td>
</tr>
<tr>
<td>77</td>
<td>Sodium nitrite</td>
</tr>
<tr>
<td>78</td>
<td>N-Nitrosodiphenylamine</td>
</tr>
<tr>
<td>79</td>
<td>Urotropine Hexamethylenetetramine</td>
</tr>
<tr>
<td>81</td>
<td>Formaldehyde solution</td>
</tr>
<tr>
<td>82</td>
<td>Potassium persulfate</td>
</tr>
<tr>
<td>83</td>
<td>Polyethylene</td>
</tr>
<tr>
<td></td>
<td>Chemical Name</td>
</tr>
<tr>
<td>---</td>
<td>--------------------------------------------</td>
</tr>
<tr>
<td>84</td>
<td>Polyether 24K</td>
</tr>
<tr>
<td>86</td>
<td>Sodium polyphosphate</td>
</tr>
<tr>
<td>87</td>
<td>Silicon dioxide</td>
</tr>
<tr>
<td>91</td>
<td>Sodium anthraquinone-2-sulfonate</td>
</tr>
<tr>
<td>92</td>
<td>Silica gel</td>
</tr>
<tr>
<td>93</td>
<td>Resin 101K</td>
</tr>
<tr>
<td>95</td>
<td>Sodium hydrosulfite</td>
</tr>
<tr>
<td>96</td>
<td>Sodium dibutylidithiocarbamate</td>
</tr>
<tr>
<td>97</td>
<td>Sodium dodecyl (Lauryl) Sulfate 30%</td>
</tr>
<tr>
<td>98</td>
<td>Diphenylamine</td>
</tr>
<tr>
<td>99</td>
<td>Sodium Sulfite</td>
</tr>
<tr>
<td>100</td>
<td>Sodium Pholyphosphate</td>
</tr>
<tr>
<td>101</td>
<td>Ethanol</td>
</tr>
<tr>
<td>102</td>
<td>Styrene</td>
</tr>
<tr>
<td>104</td>
<td>Tristearin (Parafin)</td>
</tr>
<tr>
<td>105</td>
<td>Toluene</td>
</tr>
<tr>
<td>106</td>
<td>Vinyltoluene</td>
</tr>
<tr>
<td>107</td>
<td>Talc</td>
</tr>
<tr>
<td>108</td>
<td>Phenothiazine</td>
</tr>
<tr>
<td>109</td>
<td>Tetraethylthiuram disulfide D</td>
</tr>
<tr>
<td>110</td>
<td>Tetraethylthiuram disulfide E</td>
</tr>
<tr>
<td>111</td>
<td>Antimony(III) oxide</td>
</tr>
<tr>
<td>112</td>
<td>4-tert-Butylcatechol</td>
</tr>
<tr>
<td>113</td>
<td>Triethanolamine</td>
</tr>
<tr>
<td>114</td>
<td>Sodium tripolyphosphate</td>
</tr>
<tr>
<td>115</td>
<td>Zeolite (NaX)</td>
</tr>
<tr>
<td>116</td>
<td>Manganese(IV) oxide</td>
</tr>
<tr>
<td>117</td>
<td>Zinc Oxide</td>
</tr>
<tr>
<td>120</td>
<td>Sodium hydroxymethanesulfinate hydrate</td>
</tr>
<tr>
<td>121</td>
<td>Sodium chloride solution</td>
</tr>
<tr>
<td>130</td>
<td>Sodium hydroxide</td>
</tr>
<tr>
<td>135</td>
<td>Ammonium chloride</td>
</tr>
<tr>
<td>135</td>
<td>Copper(I) chloride</td>
</tr>
<tr>
<td>136</td>
<td>3,4-Dichloro-1-butene</td>
</tr>
<tr>
<td>141</td>
<td>Propionic acid</td>
</tr>
</tbody>
</table>
142 Diisopropyl ether
145 Chlorine
151 Ethanolamine
152 Bentonite
162 Chloroprene solution
SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers
   Product name: 2,6-Di-tert-butyl-4-methylphenol

   Product Number: B1378
   Brand: Aldrich
   REACH No.: A registration number is not available for this substance as the substance or its uses are exempted from registration, the annual tonnage does not require a registration or the registration is envisaged for a later registration deadline.
   CAS-No.: 128-37-0

1.2 Relevant identified uses of the substance or mixture and uses advised against
   Identified uses: Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet
   Company: Sigma-Aldrich Chemie GmbH
   Riedstrasse 2
   D-89555 STEINHEIM
   Telephone: +49 89-6513-1444
   Fax: +49 7329-97-2319
   E-mail address: eurtechserv@sial.com

1.4 Emergency telephone number
   Emergency Phone # 0800 181 7059 (CHEMTREC Deutschland)
   +49 (0)696 43508409 (CHEMTREC weltweit)

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture
   Classification according to Regulation (EC) No 1272/2008
   Acute aquatic toxicity (Category 1), H400
   Chronic aquatic toxicity (Category 1), H410

   For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 Label elements
   Labelling according Regulation (EC) No 1272/2008
   Pictogram

   Signal word: Warning
   Hazard statement(s)
     H410: Very toxic to aquatic life with long lasting effects.
   Precautionary statement(s): none
   Supplemental Hazard: none
2.3 Other hazards
This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

SECTION 3: Composition/information on ingredients

3.1 Substances

<table>
<thead>
<tr>
<th>Component</th>
<th>Classification</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>2,6-di-tert-Butyl-p-cresol</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CAS-No. 128-37-0</td>
<td>Aquatic Acute 1; Aquatic Chronic 1; H400, H410</td>
<td></td>
</tr>
<tr>
<td>EC-No. 204-881-4</td>
<td>M-Factor - Aquatic Acute: 1</td>
<td>&lt;= 100%</td>
</tr>
</tbody>
</table>

For the full text of the H-Statements mentioned in this Section, see Section 16.

SECTION 4: First aid measures

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
Carbon oxides

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.
SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation.
For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up
Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling
Provide appropriate exhaust ventilation at places where dust is formed.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Store in cool place. Keep container tightly closed in a dry and well-ventilated place.
Storage class (TRGS 510): Non Combustible Solids

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

SECTION 8: Exposure controls/personal protection

8.1 Control parameters
Components with workplace control parameters

8.2 Exposure controls
Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

   Eye/face protection
Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

   Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove’s outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

The selected protective gloves have to satisfy the specifications of EU Directive 89/686/EEC and the standard EN 374 derived from it.

   Full contact
Material: Nitrile rubber
Minimum layer thickness: 0,11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

   Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0,11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)
data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de,
test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374,
contact the supplier of the CE approved gloves. This recommendation is advisory only and must
be evaluated by an industrial hygienist and safety officer familiar with the specific situation of
anticipated use by our customers. It should not be construed as offering an approval for any
specific use scenario.

**Body Protection**
Choose body protection in relation to its type, to the concentration and amount of dangerous
substances, and to the specific work-place. The type of protective equipment must be selected
according to the concentration and amount of the dangerous substance at the specific workplace.

**Respiratory protection**
Respiratory protection is not required. Where protection from nuisance levels of dusts are desired,
use type N95 (US) or type P1 (EN 143) dust masks. Use respirators and components tested and
approved under appropriate government standards such as NIOSH (US) or CEN (EU).

**Control of environmental exposure**
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into
the environment must be avoided.

---

**SECTION 9: Physical and chemical properties**

**9.1 Information on basic physical and chemical properties**

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Appearance</td>
<td>Form: powder, crystalline</td>
</tr>
<tr>
<td>Colour: white</td>
<td></td>
</tr>
<tr>
<td>b) Odour</td>
<td>No data available</td>
</tr>
<tr>
<td>c) Odour Threshold</td>
<td>No data available</td>
</tr>
<tr>
<td>d) pH</td>
<td>No data available</td>
</tr>
<tr>
<td>e) Melting point/freezing point</td>
<td>Melting point/range: 69 - 73 °C - lit.</td>
</tr>
<tr>
<td>f) Initial boiling point and boiling range</td>
<td>265 °C - lit.</td>
</tr>
<tr>
<td>g) Flash point</td>
<td>127,0 °C - closed cup</td>
</tr>
<tr>
<td>h) Evaporation rate</td>
<td>No data available</td>
</tr>
<tr>
<td>i) Flammability (solid, gas)</td>
<td>No data available</td>
</tr>
<tr>
<td>j) Upper/lower flammability or explosive limits</td>
<td>No data available</td>
</tr>
<tr>
<td>k) Vapour pressure</td>
<td>0,01 hPa at 20,0 °C</td>
</tr>
<tr>
<td>l) Vapour density</td>
<td>No data available</td>
</tr>
<tr>
<td>m) Relative density</td>
<td>1,05 g/cm3 at 20 °C</td>
</tr>
<tr>
<td>n) Water solubility</td>
<td>0,0004 g/l at 20 °C - slightly soluble</td>
</tr>
<tr>
<td>o) Partition coefficient: n-octanol/water</td>
<td>log Pow: 5,1</td>
</tr>
<tr>
<td>p) Auto-ignition temperature</td>
<td>470,0 °C</td>
</tr>
<tr>
<td>q) Decomposition temperature</td>
<td>No data available</td>
</tr>
</tbody>
</table>
9.2 **Other safety information**

- Solubility in other solvents:
  - Toluene - soluble
  - Methanol - soluble
  - Acetone - soluble
- Dissociation constant: 12.2

---

**SECTION 10: Stability and reactivity**

10.1 **Reactivity**
No data available

10.2 **Chemical stability**
Stable under recommended storage conditions.

10.3 **Possibility of hazardous reactions**
No data available

10.4 **Conditions to avoid**
No data available

10.5 **Incompatible materials**
Acid chlorides, Acid anhydrides, Oxidizing agents, Bases, Brass, Copper

10.6 **Hazardous decomposition products**
Other decomposition products - No data available
In the event of fire: see section 5

---

**SECTION 11: Toxicological information**

11.1 **Information on toxicological effects**

**Acute toxicity**
LD50 Oral - Rat - male and female - > 6.000 mg/kg
(OECD Test Guideline 401)

LD50 Dermal - Rat - male and female - > 2.000 mg/kg
(OECD Test Guideline 402)

**Skin corrosion/irritation**
No data available

**Serious eye damage/eye irritation**
Eyes - Rabbit
Result: No eye irritation
(Read-across (Analogy))

**Respiratory or skin sensitisation**
No data available

**Germ cell mutagenicity**
Ames test
S. typhimurium
Result: negative

Mouse - male and female
Result: negative
Carcinogenicity
This product is or contains a component that is not classifiable as to its carcinogenicity based on its IARC, ACGIH, NTP, or EPA classification.

IARC: 3 - Group 3: Not classifiable as to its carcinogenicity to humans (2,6-di-tert-Butyl-p-cresol)

Reproductive toxicity
No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

Additional Information
Repeated dose Rat - male and female - Oral - NOAEL: 25 mg/kg
toxicity RTECS: GO7875000

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

SECTION 12: Ecological information

12.1 Toxicity
Toxicity to fish LC50 - Oryzias latipes - 5,3 mg/l - 48 h
Toxicity to daphnia and other aquatic invertebrates static test EC50 - Daphnia magna (Water flea) - 0,48 mg/l - 48 h
(OECD Test Guideline 202)
Toxicity to bacteria Growth inhibition EC50 - Protozoa - 1,7 mg/l - 24 h

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

12.6 Other adverse effects
Very toxic to aquatic life with long lasting effects.

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product
Offer surplus and non-recyclable solutions to a licensed disposal company. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Contaminated packaging
Dispose of as unused product.
SECTION 14: Transport information

14.1 UN number
ADR/RID: 3077  IMDG: 3077  IATA: 3077

14.2 UN proper shipping name
ADR/RID: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (2,6-di-tert-Butyl-p-cresol)
IMDG: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (2,6-di-tert-Butyl-p-cresol)
IATA: Environmentally hazardous substance, solid, n.o.s. (2,6-di-tert-Butyl-p-cresol)

14.3 Transport hazard class(es)
ADR/RID: 9  IMDG: 9  IATA: 9

14.4 Packaging group
ADR/RID: III  IMDG: III  IATA: III

14.5 Environmental hazards
ADR/RID: yes  IMDG Marine pollutant: yes  IATA: yes

14.6 Special precautions for user

Further information
EHS-Mark required (ADR 2.2.9.1.10, IMDG code 2.10.3) for single packagings and combination packagings containing inner packagings with Dangerous Goods > 5L for liquids or > 5kg for solids.

SECTION 15: Regulatory information

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture
This safety datasheet complies with the requirements of Regulation (EC) No. 1907/2006.

15.2 Chemical Safety Assessment
For this product a chemical safety assessment was not carried out

SECTION 16: Other information

Full text of H-Statements referred to under sections 2 and 3.
H400 Very toxic to aquatic life.
H410 Very toxic to aquatic life with long lasting effects.

Further information
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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.
SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers
   Product name: Aluminum sulfate
   Product Number: 202614
   Brand: Aldrich
   REACH No.: A registration number is not available for this substance as the substance or its uses are exempted from registration, the annual tonnage does not require a registration or the registration is envisaged for a later registration deadline.
   CAS-No.: 10043-01-3

1.2 Relevant identified uses of the substance or mixture and uses advised against
   Identified uses: Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet
   Company: Sigma-Aldrich Chemie GmbH
   Riedstrasse 2
   D-89555 STEINHEIM
   Telephone: +49 89-6513-1444
   Fax: +49 7329-97-2319
   E-mail address: eurtechserv@sigma.com

1.4 Emergency telephone number
   Emergency Phone #: 0800 181 7059 (CHEMTREC Deutschland)
   +49 (0)696 43508409 (CHEMTREC weltweit)

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture
   Classification according to Regulation (EC) No 1272/2008
   Corrosive to metals (Category 1), H290
   Serious eye damage (Category 1), H318

   For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 Label elements
   Labelling according Regulation (EC) No 1272/2008
   Pictogram
   Signal word: Danger
   Hazard statement(s)
   H290: May be corrosive to metals.
   H318: Causes serious eye damage.
Precautionary statement(s)

P280 Wear eye protection/ face protection.
P305 + P351 + P338 + P310 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a POISON CENTER/doctor.

Supplemental Hazard Statements none

2.3 Other hazards
This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

SECTION 3: Composition/information on ingredients

3.1 Substances
Formula : Al₂O₃S₃
Molecular weight : 342.15 g/mol
CAS-No. : 10043-01-3
EC-No. : 233-135-0

<table>
<thead>
<tr>
<th>Hazardous ingredients according to Regulation (EC) No 1272/2008</th>
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</thead>
<tbody>
<tr>
<td>Component</td>
</tr>
<tr>
<td>--------------------</td>
</tr>
<tr>
<td>Aluminium sulphate</td>
</tr>
<tr>
<td>EC-No.</td>
</tr>
</tbody>
</table>

For the full text of the H-Statements mentioned in this Section, see Section 16.

SECTION 4: First aid measures

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.
5.2 Special hazards arising from the substance or mixture
No data available

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
No data available

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
Wear respiratory protection. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust. For personal protection see section 8.

6.2 Environmental precautions
Do not let product enter drains.

6.3 Methods and materials for containment and cleaning up
Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling
Avoid formation of dust and aerosols. Provide appropriate exhaust ventilation at places where dust is formed. For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Store in cool place. Keep container tightly closed in a dry and well-ventilated place. hygroscopic Store under inert gas.

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

SECTION 8: Exposure controls/personal protection

8.1 Control parameters
Components with workplace control parameters

8.2 Exposure controls
Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment
  
Eye/face protection
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

The selected protective gloves have to satisfy the specifications of EU Directive 89/686/EEC and the standard EN 374 derived from it.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0,11 mm
Break through time: 480 min
Material tested:Dermatri® (KCL 740 / Aldrich Z677272, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0,11 mm
Break through time: 480 min
Material tested:Dermatri® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de,
test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374,
contact the supplier of the CE approved gloves. This recommendation is advisory only and must
be evaluated by an industrial hygienist and safety officer familiar with the specific situation of
anticipated use by our customers. It should not be construed as offering an approval for any
specific use scenario.

Body Protection
Complete suit protecting against chemicals, The type of protective equipment must be selected
according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face particle
respirator type N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineering
controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use
respirators and components tested and approved under appropriate government standards such as
NIOSH (US) or CEN (EU).

Control of environmental exposure
Do not let product enter drains.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a) Appearance Form: powder
   Colour: white
b) Odour No data available
c) Odour Threshold No data available
d) pH No data available
e) Melting point/freezing point Melting point/range: 770 °C - dec.
f) Initial boiling point and boiling range No data available
g) Flash point No data available
h) Evaporation rate No data available
i) Flammability (solid, gas) The product is not flammable. - Flammability (solids)
j) Upper/lower flammability or explosive limits No data available
k) Vapour pressure No data available
l) Vapour density No data available
m) Relative density 2.71 g/mL at 25 °C
n) Water solubility 1.000 g/l at 20 °C - OECD Test Guideline 105 - completely miscible
9.2 Other safety information

Surface tension 73 mN/m at 20 °C

SECTION 10: Stability and reactivity

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
Air Exposure to moisture

10.5 Incompatible materials
Incompatible with strong bases and oxidizing agents, Ammonia, Water, Amines

10.6 Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Sulphur oxides, Aluminum oxide
Other decomposition products - No data available
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - male and female - > 5.000 mg/kg
(OECD Test Guideline 401)

Skin corrosion/irritation
Skin - Rabbit
Result: No skin irritation - 4 h
(OECD Test Guideline 404)

Serious eye damage/eye irritation
Eyes - Rabbit
Result: Irritating to eyes.
(OECD Test Guideline 405)

Respiratory or skin sensitisation
No data available

Germ cell mutagenicity
Ames test
S. typhimurium
Result: negative
Rat
Cytogenetic analysis

Carcinogenicity
IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

Reproductive toxicity
Reproductive toxicity - Rat - Intratesticular
Paternal Effects: Spermatogenesis (including genetic material, sperm morphology, motility, and count).
Paternal Effects: Testes, epididymis, sperm duct.
Reproductive toxicity - Mouse - Intraperitoneal
Effects on Newborn: Growth statistics (e.g., reduced weight gain). Effects on Newborn: Behavioral.

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

Additional Information
RTECS: BD1700000
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

SECTION 12: Ecological information

12.1 Toxicity
Toxicity to daphnia and LC50 - Daphnia magna (Water flea) - 38,2 mg/l - 48 h other aquatic invertebrates

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

12.6 Other adverse effects
No data available

SECTION 13: Disposal considerations

13.1 Waste treatment methods
Product
Offer surplus and non-recyclable solutions to a licensed disposal company. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.
Contaminated packaging
Dispose of as unused product.

SECTION 14: Transport information

14.1 UN number
ADR/RID: 3260
IMDG: 3260
IATA: 3260

14.2 UN proper shipping name
ADR/RID: CORROSIVE SOLID, ACIDIC, INORGANIC, N.O.S. (Aluminium sulphate)
IMDG: CORROSIVE SOLID, ACIDIC, INORGANIC, N.O.S. (Aluminium sulphate)
IATA: Corrosive solid, acidic, inorganic, n.o.s. (Aluminium sulphate)

14.3 Transport hazard class(es)
ADR/RID: 8
IMDG: 8
IATA: 8

14.4 Packaging group
ADR/RID: III
IMDG: III
IATA: III

14.5 Environmental hazards
ADR/RID: no
IMDG Marine pollutant: no
IATA: no

14.6 Special precautions for user
No data available

SECTION 15: Regulatory information

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture
This safety datasheet complies with the requirements of Regulation (EC) No. 1907/2006.

15.2 Chemical safety assessment
For this product a chemical safety assessment was not carried out

SECTION 16: Other information

Full text of H-Statements referred to under sections 2 and 3.

H290 May be corrosive to metals.
H318 Causes serious eye damage.

Further information
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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.
SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers

- **Product name**: Ammonium chloride
- **Brand**: Sigma
- **Index-No.**: 017-014-00-8
- **REACH No.**: A registration number is not available for this substance as the substance or its uses are exempted from registration, the annual tonnage does not require a registration or the registration is envisaged for a later registration deadline.
- **CAS-No.**: 12125-02-9

1.2 Relevant identified uses of the substance or mixture and uses advised against

- **Identified uses**: Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet

- **Company**: Sigma-Aldrich Chemie GmbH
  Riedstrasse 2
  D-89555 STEINHEIM
- **Telephone**: +49 89-6513-1444
- **Fax**: +49 7329-97-2319
- **E-mail address**: eurtechserv@sial.com

1.4 Emergency telephone number

- **Emergency Phone #**: 0800 181 7059 (CHEMTREC Deutschland)
  +49 (0)696 43508409 (CHEMTREC weltweit)

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

- **Classification according to Regulation (EC) No 1272/2008**
  - Acute toxicity, Oral (Category 4), H302
  - Eye irritation (Category 2), H319

  For the full text of the H-Statements mentioned in this Section, see Section 16.

- **Classification according to EU Directives 67/548/EEC or 1999/45/EC**
  - Xn Harmful R22
  - Xi Irritant R36

  For the full text of the R-phrases mentioned in this Section, see Section 16.

2.2 Label elements

- **Labelling according Regulation (EC) No 1272/2008**
  - **Pictogram**: !
  - **Signal word**: Warning

  - **Hazard statement(s)**: H302 Harmful if swallowed.
H319  Causes serious eye irritation.
Precautionary statement(s)  IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
Supplemental Hazard Statements  none

2.3 Other hazards
This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

SECTION 3: Composition/information on ingredients

3.1 Substances
Synonyms  : Salmiac
Formula  : H₄ClN
Molecular weight  : 53.49 g/mol
CAS-No.  : 12125-02-9
EC-No.  : 235-186-4
Index-No.  : 017-014-00-8

Hazardous ingredients according to Regulation (EC) No 1272/2008

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<thead>
<tr>
<th>Component</th>
<th>Classification</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ammonium chloride</td>
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<tr>
<td>CAS-No.</td>
<td>12125-02-9</td>
<td>Acute Tox. 4; Eye Irrit. 2; H302, H319</td>
</tr>
<tr>
<td>EC-No.</td>
<td>235-186-4</td>
<td>&lt;= 100 %</td>
</tr>
<tr>
<td>Index-No.</td>
<td>017-014-00-8</td>
<td></td>
</tr>
</tbody>
</table>

Hazardous ingredients according to Directive 1999/45/EC

<table>
<thead>
<tr>
<th>Component</th>
<th>Classification</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ammonium chloride</td>
<td></td>
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<tr>
<td>CAS-No.</td>
<td>12125-02-9</td>
<td>Xn, R22 - R36</td>
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<tr>
<td>EC-No.</td>
<td>235-186-4</td>
<td>&lt;= 100 %</td>
</tr>
<tr>
<td>Index-No.</td>
<td>017-014-00-8</td>
<td></td>
</tr>
</tbody>
</table>

For the full text of the H-Statements and R-Phrases mentioned in this Section, see Section 16

SECTION 4: First aid measures

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11
4.3 Indication of any immediate medical attention and special treatment needed
No data available

SECTION 5: Firefighting measures
5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
No data available

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
No data available

SECTION 6: Accidental release measures
6.1 Personal precautions, protective equipment and emergency procedures

Use personal protective equipment. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Avoid breathing dust.
For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up
Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

SECTION 7: Handling and storage
7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid formation of dust and aerosols.
Provide appropriate exhaust ventilation at places where dust is formed.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Store in cool place. Keep container tightly closed in a dry and well-ventilated place.
Hygroscopic.

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

SECTION 8: Exposure controls/personal protection
8.1 Control parameters
Components with workplace control parameters

8.2 Exposure controls
Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.
Personal protective equipment

Eye/face protection
Safety glasses with side-shields conforming to EN166 Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove’s outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

The selected protective gloves have to satisfy the specifications of EU Directive 89/686/EEC and the standard EN 374 derived from it.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0,11 mm
Break through time: 480 min
Material tested: Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0,11 mm
Break through time: 480 min
Material tested: Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
For nuisance exposures use type P95 (US) or type P1 (EU EN 143) particle respirator. For higher level protection use type OV/AG/P99 (US) or type ABEK-P2 (EU EN 143) respirator cartridges. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

- **Appearance**
  - Form: Crystalline powder

- **Odour**
  - No data available

- **Odour Threshold**
  - No data available

- **pH**
  - 4,5 - 5,5 at 50,00000 g/l at 20,0 °C

- **Melting point/freezing point**
  - 340,0 °C

- **Initial boiling point and boiling range**
  - No data available

- **Flash point**
  - Not applicable
9.2 Other safety information

Bulk density 500 kg/m3

SECTION 10: Stability and reactivity

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
Exposure to moisture may affect product quality.

10.5 Incompatible materials
Strong acids, Strong bases, Strong oxidizing agents

10.6 Hazardous decomposition products
Other decomposition products - No data available
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - 1.650 mg/kg

Skin corrosion/irritation
Skin - Rabbit
Result: No skin irritation

Serious eye damage/eye irritation
Eyes - Rabbit
Result: Eye irritation
Respiratory or skin sensitisation
Will not occur

Germ cell mutagenicity
No data available

Carcinogenicity
IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

Reproductive toxicity
No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

Additional Information
RTECS: BP4550000
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

SECTION 12: Ecological information

12.1 Toxicity
Toxicity to fish
LC50 - Cyprinus carpio (Carp) - 209,00 mg/l - 96 h
LC50 - Oncorhynchus mykiss (rainbow trout) - 3,98 mg/l - 96 h
NOEC - Oncorhynchus mykiss (rainbow trout) - 57 mg/l - 96 h
Toxicity to daphnia and other aquatic invertebrates
LC50 - Daphnia magna (Water flea) - 161 mg/l - 48 h
Growth inhibition NOEC - Daphnia magna (Water flea) - 0,1 mg/l - 216 h

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

12.6 Other adverse effects
Toxic to aquatic life.

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product
Offer surplus and non-recyclable solutions to a licensed disposal company. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.
Contaminated packaging
Dispose of as unused product.

SECTION 14: Transport information

14.1 UN number
ADR/RID: -  IMDG: -  IATA: -

14.2 UN proper shipping name
ADR/RID: Not dangerous goods
IMDG: Not dangerous goods
IATA: Not dangerous goods

14.3 Transport hazard class(es)
ADR/RID: -  IMDG: -  IATA: -

14.4 Packaging group
ADR/RID: -  IMDG: -  IATA: -

14.5 Environmental hazards
ADR/RID: no  IMDG Marine pollutant: no  IATA: no

14.6 Special precautions for user
No data available

SECTION 15: Regulatory information

This safety datasheet complies with the requirements of Regulation (EC) No. 1907/2006.

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture
No data available

15.2 Chemical Safety Assessment
For this product a chemical safety assessment was not carried out

SECTION 16: Other information

Full text of H-Statements referred to under sections 2 and 3.
Acute Tox.  Acute toxicity
Eye Irrit.  Eye irritation
H302  Harmful if swallowed.
H319  Causes serious eye irritation.

Full text of R-phrases referred to under sections 2 and 3
Xn  Harmful
R22  Harmful if swallowed.
R36  Irritating to eyes.

Further information
Copyright 2014 Sigma-Aldrich Co. LLC. License granted to make unlimited paper copies for internal use only.
The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.
SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers

<table>
<thead>
<tr>
<th>Product name</th>
<th>Phthalic anhydride</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product Number</td>
<td>320064</td>
</tr>
<tr>
<td>Brand</td>
<td>Sigma-Aldrich</td>
</tr>
<tr>
<td>Index-No.</td>
<td>607-009-00-4</td>
</tr>
<tr>
<td>REACH No.</td>
<td>A registration number is not available for this substance as the substance or its uses are exempted from registration, the annual tonnage does not require a registration or the registration is envisaged for a later registration deadline.</td>
</tr>
<tr>
<td>CAS-No.</td>
<td>85-44-9</td>
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</table>

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses: Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet

<table>
<thead>
<tr>
<th>Company</th>
<th>Sigma-Aldrich Chemie GmbH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Riedstrasse 2</td>
<td>D-89555 STEINHEIM</td>
</tr>
<tr>
<td>Telephone</td>
<td>+49 89-6513-1444</td>
</tr>
<tr>
<td>Fax</td>
<td>+49 7329-97-2319</td>
</tr>
<tr>
<td>E-mail address</td>
<td><a href="mailto:eurtechserv@sigma.com">eurtechserv@sigma.com</a></td>
</tr>
</tbody>
</table>

1.4 Emergency telephone number

<table>
<thead>
<tr>
<th>Emergency Phone #</th>
<th>0800 181 7059 (CHEMTREC Deutschland)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>+49 (0)696 43508409 (CHEMTREC weltweit)</td>
</tr>
</tbody>
</table>

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

Classification according to Regulation (EC) No 1272/2008

- Acute toxicity, Oral (Category 4), H302
- Skin irritation (Category 2), H315
- Serious eye damage (Category 1), H318
- Respiratory sensitisation (Category 1), H334
- Skin sensitisation (Category 1), H317
- Specific target organ toxicity - single exposure (Category 3), Respiratory system, H335

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 Label elements

Labelling according Regulation (EC) No 1272/2008

Pictogram

<table>
<thead>
<tr>
<th>Signal word</th>
<th>Danger</th>
</tr>
</thead>
</table>

SECTION 3: Composition/information on ingredients

3.1 Substances

<table>
<thead>
<tr>
<th>Component</th>
<th>Classification</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phthalic anhydride</td>
<td>Acute Tox. 4; Skin Irrit. 2; Eye Dam. 1; Resp. Sens. 1; Skin Sens. 1; STOT SE 3; H302, H315, H318, H334, H317, H335</td>
<td>&lt;= 100 %</td>
</tr>
</tbody>
</table>

For the full text of the H-Statements mentioned in this Section, see Section 16.

SECTION 4: First aid measures

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.
In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

SECTION 5: Firefighting measures

5.1 Extinguishing media
Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
No data available

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
No data available

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
Use personal protective equipment. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust. For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up
Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid formation of dust and aerosols. Provide appropriate exhaust ventilation at places where dust is formed. For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Store in cool place. Keep container tightly closed in a dry and well-ventilated place.

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated
SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Components with workplace control parameters

8.2 Exposure controls

Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

The selected protective gloves have to satisfy the specifications of EU Directive 89/686/EEC and the standard EN 374 derived from it.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0,11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0,11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Complete suit protecting against chemicals. The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.
SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a) Appearance
   Form: flakes
   Colour: white
b) Odour
   No data available
c) Odour Threshold
   No data available
d) pH
   2 at 6 g/l at 20 °C
e) Melting point/freezing point
   Melting point/range: 131 - 134 °C - lit.
f) Initial boiling point and boiling range
   284 °C - lit.
g) Flash point
   152 °C - closed cup
h) Evaporation rate
   No data available
i) Flammability (solid, gas)
   No data available
j) Upper/lower flammability or explosive limits
   Upper explosion limit: 10.4 %(V)
   Lower explosion limit: 1.7 %(V)
k) Vapour pressure
   < 0.01 hPa at 20 °C
l) Vapour density
   No data available
m) Relative density
   1.53 g/cm3 at 20 °C
n) Water solubility
   16.4 g/l at 20 °C - soluble
o) Partition coefficient: n-octanol/water
   log Pow: 1.6 at 20 °C
p) Auto-ignition temperature
   580 °C
q) Decomposition temperature
   No data available
r) Viscosity
   No data available
s) Explosive properties
   No data available
t) Oxidizing properties
   No data available

9.2 Other safety information

Surface tension
   32.7 mN/m at 180 °C

SECTION 10: Stability and reactivity

10.1 Reactivity
   No data available

10.2 Chemical stability
   Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
   No data available

10.4 Conditions to avoid
   Avoid moisture.

10.5 Incompatible materials
   Strong acids, Strong bases, Strong oxidizing agents, Strong reducing agents
10.6 **Hazardous decomposition products**
Hazardous decomposition products formed under fire conditions. - Carbon oxides
Other decomposition products - No data available
In the event of fire: see section 5

---

**SECTION 11: Toxicological information**

11.1 **Information on toxicological effects**

**Acute toxicity**
LD50 Oral - Rat - male - 1.530 mg/kg
LC50 Inhalation - Rat - 4 h - > 2,14 mg/l
(OECD Test Guideline 403)
LD50 Dermal - Rabbit - > 10.000 mg/kg

**Skin corrosion/irritation**
Skin - Rabbit
Result: Mild skin irritation - 24 h

**Serious eye damage/eye irritation**
Eyes - Rabbit
Result: Moderate eye irritation
(Draize Test)

**Respiratory or skin sensitisation**
Maximisation Test - Guinea pig
May cause allergic skin reaction.
(OECD Test Guideline 406)
in vivo assay - Guinea pig
May cause allergic respiratory reaction.

**Germ cell mutagenicity**
reverse mutation assay
S. typhimurium
Result: negative

**Carcinogenicity**
IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

**Reproductive toxicity**
No data available

**Specific target organ toxicity - single exposure**
Inhalation - May cause respiratory irritation.

**Specific target organ toxicity - repeated exposure**
No data available

**Aspiration hazard**
No data available

**Additional Information**
Repeated dose Rat - male and female - Oral - NOAEL : 500 mg/kg
toxicity
RTECS: TI3150000

Prolonged or repeated exposure can cause:, Liver injury may occur, Kidney injury may occur, Exposure to and/or consumption of alcohol may increase toxic effects, To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.
SECTION 12: Ecological information

12.1 Toxicity
Toxicity to fish
- semi-static test LC50 - Danio rerio (zebra fish) - 560 mg/l - 7 d
Toxicity to daphnia and other aquatic invertebrates
- Immobilization EC50 - Daphnia magna (Water flea) - > 640 mg/l - 48 h
Toxicity to algae
- EC50 - Pseudokirchneriella subcapitata (green algae) - 60 - 350 mg/l - 96 h

12.2 Persistence and degradability
Biodegradability
- Biotic/Aerobic - Exposure time 14 d
  Result: 85 % - Readily biodegradable
  (OECD Test Guideline 301)

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

12.6 Other adverse effects
Harmful to aquatic life.
No data available

SECTION 13: Disposal considerations

13.1 Waste treatment methods
Product
Offer surplus and non-recyclable solutions to a licensed disposal company. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Contaminated packaging
Dispose of as unused product.

SECTION 14: Transport information

14.1 UN number
ADR/RID: - IMDG: - IATA: -

14.2 UN proper shipping name
ADR/RID: Not dangerous goods IMDG: Not dangerous goods IATA: Not dangerous goods

14.3 Transport hazard class(es)
ADR/RID: - IMDG: - IATA: -

14.4 Packaging group
ADR/RID: - IMDG: - IATA: -

14.5 Environmental hazards
ADR/RID: no IMDG Marine pollutant: no IATA: no

14.6 Special precautions for user
No data available

SECTION 15: Regulatory information
15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture
This safety datasheet complies with the requirements of Regulation (EC) No. 1907/2006.

15.2 Chemical safety assessment
For this product a chemical safety assessment was not carried out

SECTION 16: Other information

Full text of H-Statements referred to under sections 2 and 3.

H302 Harmful if swallowed.
H315 Causes skin irritation.
H317 May cause an allergic skin reaction.
H318 Causes serious eye damage.
H334 May cause allergy or asthma symptoms or breathing difficulties if inhaled.
H335 May cause respiratory irritation.

Further information
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The above information is believed to be correct but does not purport to be all inclusive and shall be
used only as a guide. The information in this document is based on the present state of our knowledge
and is applicable to the product with regard to appropriate safety precautions. It does not represent any
guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held
liable for any damage resulting from handling or from contact with the above product. See www.sigma-
aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.
SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers
   Product name: Aniline

   Product Number: 242284
   Brand: Sigma-Aldrich
   Index-No.: 612-008-00-7
   REACH No.: A registration number is not available for this substance as the substance or its uses are exempted from registration, the annual tonnage does not require a registration or the registration is envisaged for a later registration deadline.
   CAS-No.: 62-53-3

1.2 Relevant identified uses of the substance or mixture and uses advised against
   Identified uses: Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet
   Company: Sigma-Aldrich Chemie GmbH
   Riedstrasse 2
   D-89555 STEINHEIM
   Telephone: +49 89-6513-1444
   Fax: +49 7329-97-2319
   E-mail address: eurtechserv@sial.com

1.4 Emergency telephone number
   Emergency Phone #: 0800 181 7059 (CHEMTREC Deutschland)
   +49 (0)696 43508409 (CHEMTREC weltweit)

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

Classification according to Regulation (EC) No 1272/2008
   Acute toxicity, Inhalation (Category 3), H331
   Acute toxicity, Dermal (Category 3), H311
   Acute toxicity, Oral (Category 3), H301
   Serious eye damage (Category 1), H318
   Skin sensitisation (Category 1), H317
   Germ cell mutagenicity (Category 2), H341
   Carcinogenicity (Category 2), H351
   Specific target organ toxicity - repeated exposure (Category 1), Blood, H372
   Specific target organ toxicity - repeated exposure (Category 1), H372
   Acute aquatic toxicity (Category 1), H400
   Chronic aquatic toxicity (Category 1), H410

   For the full text of the H-Statements mentioned in this Section, see Section 16.

Classification according to EU Directives 67/548/EEC or 1999/45/EC
   T  Toxic
      R23/24/25, R48/23/24/25
      R40
      R68
   Xi Irritant
      R41
2.2 Label elements

Labelling according Regulation (EC) No 1272/2008

Pictogram

Signal word | Danger
---|---
Hazard statement(s)
H301 + H311 + H331 | Toxic if swallowed, in contact with skin or if inhaled
H317 | May cause an allergic skin reaction.
H318 | Causes serious eye damage.
H341 | Suspected of causing genetic defects.
H351 | Suspected of causing cancer.
H372 | Causes damage to organs (Blood) through prolonged or repeated exposure.
H410 | Very toxic to aquatic life with long lasting effects.

Precautionary statement(s)
P261 | Avoid breathing vapours.
P273 | Avoid release to the environment.
P280 | Wear protective gloves/ eye protection/ face protection.
P301 + P310 | IF SWALLOWED: Immediately call a POISON CENTER or doctor/ physician.
P305 + P351 + P338 | IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P311 | Call a POISON CENTER or doctor/ physician.

Supplemental Hazard Statements

2.3 Other hazards

This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher. Rapidly absorbed through skin.

SECTION 3: Composition/information on ingredients

3.1 Substances

Formula: C₆H₇N
Molecular weight: 93.13 g/mol
CAS-No.: 62-53-3
EC-No.: 200-539-3
Index-No.: 612-008-00-7

Hazardous ingredients according to Regulation (EC) No 1272/2008

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<thead>
<tr>
<th>Component</th>
<th>Classification</th>
<th>Concentration</th>
</tr>
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<tbody>
<tr>
<td>Aniline</td>
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<tr>
<td>CAS-No.</td>
<td>62-53-3</td>
<td>Acute Tox. 3; Eye Dam. 1; Skin Sens. 1; Muta. 2; Carc. 2; STOT RE 1; Aquatic Acute 1; Aquatic Chronic 1; H301 + H311 + H331, H317, H318, H341, H351, H372, H410</td>
</tr>
<tr>
<td>EC-No.</td>
<td>200-539-3</td>
<td></td>
</tr>
<tr>
<td>Index-No.</td>
<td>612-008-00-7</td>
<td></td>
</tr>
</tbody>
</table>

Hazardous ingredients according to Directive 1999/45/EC

<table>
<thead>
<tr>
<th>Component</th>
<th>Classification</th>
<th>Concentration</th>
</tr>
</thead>
</table>
SECTION 4: First aid measures

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Take victim immediately to hospital. Consult a physician.

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If swallowed
Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
Carbon oxides, Nitrogen oxides (NOx)

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
Use water spray to cool unopened containers.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
Wear respiratory protection. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapours accumulating to form explosive concentrations. Vapours can accumulate in low areas.
For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up
Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations (see section 13). Keep in suitable, closed containers for disposal.
6.4 Reference to other sections
For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.
Keep away from sources of ignition - No smoking. Take measures to prevent the build up of electrostatic charge.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Store in cool place. Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.
Handle under inert gas. Protect from moisture. Light sensitive.
Storage class (TRGS 510): Non-combustible, acute toxic Cat. 1 and 2 / very toxic hazardous materials

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

SECTION 8: Exposure controls/personal protection

8.1 Control parameters
Components with workplace control parameters

8.2 Exposure controls
Appropriate engineering controls
Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product.

Personal protective equipment

Eye/face protection
Tightly fitting safety goggles. Faceshield (8-inch minimum). Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove’s outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.
The selected protective gloves have to satisfy the specifications of EU Directive 89/686/EEC and the standard EN 374 derived from it.

Full contact
Material: butyl-rubber
Minimum layer thickness: 0,3 mm
Break through time: 480 min
Material tested: Butoject® (KCL 897 / Aldrich Z677647, Size M)

Splash contact
Material: Nature latex/chloroprene
Minimum layer thickness: 0,6 mm
Break through time: 90 min
Material tested: Lapren® (KCL 706 / Aldrich Z677558, Size M)
data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de,
test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of
anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

**Body Protection**
Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

**Respiratory protection**
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

**Control of environmental exposure**
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

---

**SECTION 9: Physical and chemical properties**

### 9.1 Information on basic physical and chemical properties

<table>
<thead>
<tr>
<th>a) Appearance</th>
<th>Form: liquid</th>
</tr>
</thead>
<tbody>
<tr>
<td>b) Odour</td>
<td>No data available</td>
</tr>
<tr>
<td>c) Odour Threshold</td>
<td>No data available</td>
</tr>
<tr>
<td>d) pH</td>
<td>8,8 at 36 g/l at 20 °C</td>
</tr>
<tr>
<td>e) Melting point/freezing point</td>
<td>Melting point/range: -6 °C - lit.</td>
</tr>
<tr>
<td>f) Initial boiling point and boiling range</td>
<td>184 °C - lit.</td>
</tr>
<tr>
<td>g) Flash point</td>
<td>70 °C - closed cup</td>
</tr>
<tr>
<td>h) Evaporation rate</td>
<td>No data available</td>
</tr>
<tr>
<td>i) Flammability (solid, gas)</td>
<td>No data available</td>
</tr>
<tr>
<td>j) Upper/lower flammability or explosive limits</td>
<td>Upper explosion limit: 23 % (V) Lower explosion limit: 1,3 % (V)</td>
</tr>
<tr>
<td>k) Vapour pressure</td>
<td>0,49 hPa at 20 °C 0,8 hPa at 20 °C</td>
</tr>
<tr>
<td>l) Vapour density</td>
<td>3,22 - (Air = 1.0)</td>
</tr>
<tr>
<td>m) Relative density</td>
<td>1,022 g/cm3 at 25 °C</td>
</tr>
<tr>
<td>n) Water solubility</td>
<td>soluble</td>
</tr>
<tr>
<td>o) Partition coefficient: n-octanol/water</td>
<td>log Pow: 0,91</td>
</tr>
<tr>
<td>p) Auto-ignition temperature</td>
<td>No data available</td>
</tr>
<tr>
<td>q) Decomposition temperature</td>
<td>190 °C -</td>
</tr>
<tr>
<td>r) Viscosity</td>
<td>No data available</td>
</tr>
<tr>
<td>s) Explosive properties</td>
<td>No data available</td>
</tr>
<tr>
<td>t) Oxidizing properties</td>
<td>No data available</td>
</tr>
</tbody>
</table>

### 9.2 Other safety information

| Surface tension | 42,12 mN/m at 25 °C |
SECTION 10: Stability and reactivity

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
Heat, flames and sparks.

10.5 Incompatible materials
Oxidizing agents, Iron and iron salts, Zinc

10.6 Hazardous decomposition products
Other decomposition products - No data available
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - 250 mg/kg
LC50 Inhalation - Mouse - 4 h - 248 ppm
LD50 Dermal - Rabbit - 836 mg/kg

Skin corrosion/irritation
Skin - Rabbit
Result: No skin irritation

Serious eye damage/eye irritation
Eyes - Rabbit
Result: Severe eye irritation

Respiratory or skin sensitisation
May cause sensitisation by skin contact.

Germ cell mutagenicity
Laboratory experiments have shown mutagenic effects.
In vitro tests showed mutagenic effects

Carcinogenicity
This product is or contains a component that has been reported to be possibly carcinogenic based on its IARC, ACGIH, NTP, or EPA classification.
Limited evidence of carcinogenicity in animal studies

IARC: 3 - Group 3: Not classifiable as to its carcinogenicity to humans (Aniline)

Reproductive toxicity
No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
Causes damage to organs through prolonged or repeated exposure. - Blood
**Aspiration hazard**
No data available

**Additional Information**
RTECS: BW6650000

Absorption into the body leads to the formation of methemoglobin which in sufficient concentration causes cyanosis. Onset may be delayed 2 to 4 hours or longer., Cyanosis, Headache, Vomiting, Nausea, Incoordination., fatigue, Dizziness, Drowsiness, Confusion., Weakness, Unconsciousness, Symptoms may be delayed.
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

---

**SECTION 12: Ecological information**

**12.1 Toxicity**

- **Toxicity to fish**
  LC50 - Oncorhynchus mykiss (rainbow trout) - 10,6 mg/l - 96,0 h
- **Toxicity to daphnia and other aquatic invertebrates**
  EC50 - Daphnia magna (Water flea) - 80 - 380 mg/l - 48 h
  semi-static test EC50 - Daphnia magna (Water flea) - 0,16 mg/l - 48 h
- **Toxicity to algae**
  EC50 - SELENASTRUM - 19 mg/l - 72 h

**12.2 Persistence and degradability**

- **Biodegradability**
  aerobic - Exposure time 30 d
  Result: 90 % - Readily biodegradable.
  (OECD Test Guideline 301D)

**12.3 Bioaccumulative potential**
No data available

**12.4 Mobility in soil**
No data available

**12.5 Results of PBT and vPvB assessment**
This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

**12.6 Other adverse effects**
Very toxic to aquatic life with long lasting effects.

---

**SECTION 13: Disposal considerations**

**13.1 Waste treatment methods**

**Product**
This combustible material may be burned in a chemical incinerator equipped with an afterburner and scrubber. Offer surplus and non-recyclable solutions to a licensed disposal company.

**Contaminated packaging**
Dispose of as unused product.

---

**SECTION 14: Transport information**

**14.1 UN number**

ADR/RID: 1547  IMDG: 1547  IATA: 1547

**14.2 UN proper shipping name**

ADR/RID: ANILINE
IMDG: ANILINE
IATA: Aniline
### 14.3 Transport hazard class(es)

<table>
<thead>
<tr>
<th>ADR/RID:</th>
<th>IMDG:</th>
<th>IATA:</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.1</td>
<td>6.1</td>
<td>6.1</td>
</tr>
</tbody>
</table>

### 14.4 Packaging group

<table>
<thead>
<tr>
<th>ADR/RID:</th>
<th>IMDG:</th>
<th>IATA:</th>
</tr>
</thead>
<tbody>
<tr>
<td>II</td>
<td>II</td>
<td>II</td>
</tr>
</tbody>
</table>

### 14.5 Environmental hazards

<table>
<thead>
<tr>
<th>ADR/RID:</th>
<th>IMDG Marine pollutant:</th>
<th>IATA:</th>
</tr>
</thead>
<tbody>
<tr>
<td>yes</td>
<td>yes</td>
<td>no</td>
</tr>
</tbody>
</table>

### 14.6 Special precautions for user

No data available

---

### SECTION 15: Regulatory information

This safety datasheet complies with the requirements of Regulation (EC) No. 1907/2006.

#### 15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture

No data available

#### 15.2 Chemical Safety Assessment

For this product a chemical safety assessment was not carried out

---

### SECTION 16: Other information

**Full text of H-Statements referred to under sections 2 and 3.**

| Acute Tox. | Acute toxicity |
| Aquatic Acute | Acute aquatic toxicity |
| Aquatic Chronic | Chronic aquatic toxicity |
| Carc. | Carcinogenicity |
| Eye Dam. | Serious eye damage |
| H301 | Toxic if swallowed. |
| H301 + H311 | Toxic if swallowed, in contact with skin or if inhaled |
| H331 | |
| H311 | Toxic in contact with skin. |
| H317 | May cause an allergic skin reaction. |
| H318 | Causes serious eye damage. |
| H331 | Toxic if inhaled. |
| H341 | Suspected of causing genetic defects. |
| H351 | Suspected of causing cancer. |

**Full text of R-phrases referred to under sections 2 and 3**

| N | Dangerous for the environment |
| T | Toxic |
| R23/24/25 | Toxic by inhalation, in contact with skin and if swallowed. |
| R40 | Limited evidence of a carcinogenic effect. |
| R41 | Risk of serious damage to eyes. |
| R43 | May cause sensitisation by skin contact. |
| R48/23/24/25 | Toxic: danger of serious damage to health by prolonged exposure through inhalation, in contact with skin and if swallowed. |
| R50 | Very toxic to aquatic organisms. |
| R68 | Possible risk of irreversible effects. |

**Further information**

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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.
SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers
Product name: 2,4,6-Tri-tert-butylphenol

Product Number: T49409
Brand: Aldrich
REACH No.: A registration number is not available for this substance as the substance or its uses are exempted from registration, the annual tonnage does not require a registration or the registration is envisaged for a later registration deadline.
CAS-No.: 732-26-3

1.2 Relevant identified uses of the substance or mixture and uses advised against
Identified uses: Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet
Company: Sigma-Aldrich Chemie GmbH
Riedstrasse 2
D-89555 STEINHEIM

Telephone: +49 89-6513-1444
Fax: +49 7329-97-2319
E-mail address: eurtechsrev@sial.com

1.4 Emergency telephone number
Emergency Phone #: 0800 181 7059 (CHEMTREC Deutschland)
+49 (0)969 43508409 (CHEMTREC weltweit)

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture
Classification according to Regulation (EC) No 1272/2008
Acute toxicity, Oral (Category 4), H302
Acute aquatic toxicity (Category 1), H400

For the full text of the H-Statements mentioned in this Section, see Section 16.

Classification according to EU Directives 67/548/EEC or 1999/45/EC
Xn, N Harmful, Dangerous for the R22, R51/53 environment

For the full text of the R-phrases mentioned in this Section, see Section 16.

2.2 Label elements
Labelling according Regulation (EC) No 1272/2008
Pictogram

Signal word: Warning
Hazard statement(s):
H302 Harmful if swallowed.
H400 Very toxic to aquatic life.
2.3 Other hazards
This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

SECTION 3: Composition/information on ingredients

3.1 Substances

<table>
<thead>
<tr>
<th>Component</th>
<th>Classification</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>2,4,6-Tri-tert-butylphenol</td>
<td>Acute Tox. 4; Aquatic Acute 1; H302, H400</td>
<td>&lt;= 100 %</td>
</tr>
</tbody>
</table>

Hazardous ingredients according to Directive 1999/45/EC

<table>
<thead>
<tr>
<th>Component</th>
<th>Classification</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>2,4,6-Tri-tert-butylphenol</td>
<td>Xn, N, R22 - R51/53</td>
<td>&lt;= 100 %</td>
</tr>
</tbody>
</table>

For the full text of the H-Statements and R-Phrases mentioned in this Section, see Section 16

SECTION 4: First aid measures

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available
SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
Carbon oxides

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
No data available

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
Use personal protective equipment. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust.

For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up
Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid formation of dust and aerosols.
Provide appropriate exhaust ventilation at places where dust is formed.

For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Store in cool place. Keep container tightly closed in a dry and well-ventilated place.

Storage class (TRGS 510): Non Combustible Solids

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Components with workplace control parameters

8.2 Exposure controls

Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection
Safety glasses with side-shields conforming to EN166 Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).
**Skin protection**
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

The selected protective gloves have to satisfy the specifications of EU Directive 89/686/EEC and the standard EN 374 derived from it.

**Body Protection**
Complete suit protecting against chemicals. The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

**Respiratory protection**
For nuisance exposures use type P95 (US) or type P1 (EU EN 143) particle respirator. For higher level protection use type OV/AG/P99 (US) or type ABEK-P2 (EU EN 143) respirator cartridges. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

**Control of environmental exposure**
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

**SECTION 9: Physical and chemical properties**

9.1 **Information on basic physical and chemical properties**

a) Appearance  
   Form: crystalline  
   Colour: yellow

b) Odour  
   No data available

c) Odour Threshold  
   No data available

d) pH  
   No data available

e) Melting point/freezing point  
   Melting point/range: 125 - 130 °C - lit.

f) Initial boiling point and boiling range  
   277 °C - lit.

g) Flash point  
   130,00 °C - closed cup

h) Evaporation rate  
   No data available

i) Flammability (solid, gas)  
   No data available

j) Upper/lower flammability or explosive limits  
   No data available

k) Vapour pressure  
   No data available

l) Vapour density  
   No data available

m) Relative density  
   No data available

n) Water solubility  
   No data available

o) Partition coefficient: n-octanol/water  
   No data available

p) Auto-ignition temperature  
   No data available

q) Decomposition temperature  
   No data available

r) Viscosity  
   No data available

s) Explosive properties  
   No data available
t)  Oxidizing properties  No data available

9.2 Other safety information
No data available

SECTION 10: Stability and reactivity

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
No data available

10.5 Incompatible materials
Bases, Acid chlorides, Acid anhydrides, Oxidizing agents, Brass, Copper

10.6 Hazardous decomposition products
Other decomposition products - No data available
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
Skin corrosion/irritation
No data available

Serious eye damage/eye irritation
No data available

Respiratory or skin sensitisation
No data available

Germ cell mutagenicity
No data available

Carcinogenicity
IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

Reproductive toxicity
No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

Additional Information
RTECS: SN3570000

SECTION 12: Ecological information

12.1 Toxicity
Toxicity to fish
LC50 - Pimephales promelas (fathead minnow) - 0,061 mg/l - 96,0 h
12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

12.6 Other adverse effects
Very toxic to aquatic life.

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product
Offer surplus and non-recyclable solutions to a licensed disposal company. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Contaminated packaging
Dispose of as unused product.

SECTION 14: Transport information

14.1 UN number
ADR/RID: 3077
IMDG: 3077
IATA: 3077

14.2 UN proper shipping name
ADR/RID: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (2,4,6-Tri-tert-butylphenol)
IMDG: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (2,4,6-Tri-tert-butylphenol)
IATA: Environmentally hazardous substance, solid, n.o.s. (2,4,6-Tri-tert-butylphenol)

14.3 Transport hazard class(es)
ADR/RID: 9
IMDG: 9
IATA: 9

14.4 Packaging group
ADR/RID: III
IMDG: III
IATA: III

14.5 Environmental hazards
ADR/RID: yes
IMDG Marine pollutant: yes
IATA: yes

14.6 Special precautions for user

Further information
EHS-Mark required (ADR 2.2.9.1.10, IMDG code 2.10.3) for single packagings and combination packagings containing inner packagings with Dangerous Goods > 5L for liquids or > 5kg for solids.

SECTION 15: Regulatory information

This safety datasheet complies with the requirements of Regulation (EC) No. 1907/2006.

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture
No data available

15.2 Chemical Safety Assessment
For this product a chemical safety assessment was not carried out
SECTION 16: Other information

Full text of H-Statements referred to under sections 2 and 3.

Acute Tox.  Acute toxicity
Aquatic Acute  Acute aquatic toxicity
H302  Harmful if swallowed.
H400  Very toxic to aquatic life.

Full text of R-phrases referred to under sections 2 and 3

N  Dangerous for the environment
Xn  Harmful
R22  Harmful if swallowed.
R51/53  Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

Further information
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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.
LOWINOX® 22M46 stabilizer
Phenolic Antioxidant

Description
LOWINOX® 22M46 stabilizer is a non-discoloring antioxidant based on a sterically hindered alkylated bis-phenol.

Chemical Name
Phenol, 2,2’-methylenebis[6-(1,1-dimethylethyl)-4-methyl-

Synonym
2,2’-Methylenebis(6-t-butyl-4-methylphenol) 2,2’-Methylenebis(6-t-butyl-4-methylphenol)

CAS-Number:
119-47-1

EINECS-Number:
204-327-1

Formula
LOWINOX® 22M46 stabilizer

Typical physical properties of LOWINOX® 22M46 stabilizer

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appearance</td>
<td>White to off-white powder (milled/unmilled) or granules (gr)</td>
</tr>
<tr>
<td>Melting range [°C]</td>
<td>128 - 132</td>
</tr>
<tr>
<td>Molecular weight [g/mol]</td>
<td>341</td>
</tr>
<tr>
<td>Bulk density [kg/m³]</td>
<td>300 (milled) / 460 (unmilled) / 530 (gr)</td>
</tr>
</tbody>
</table>
Solubility (g/100g solvent) @ 25°C

<table>
<thead>
<tr>
<th>Solvent</th>
<th>7</th>
<th>Methanol</th>
<th>28</th>
</tr>
</thead>
<tbody>
<tr>
<td>n-Hexane</td>
<td>139</td>
<td>Toluene</td>
<td>53</td>
</tr>
<tr>
<td>Ethyl Acetate</td>
<td>&gt;200</td>
<td>Water</td>
<td>&lt;0.1</td>
</tr>
<tr>
<td>Acetone</td>
<td>62</td>
<td>Ethanol</td>
<td>80</td>
</tr>
</tbody>
</table>

Thermogravimetric Analysis (10 mg @ 10 K/minute under N₂)

<table>
<thead>
<tr>
<th>Weight Loss [%]</th>
<th>5</th>
<th>10</th>
<th>25</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature [°C]</td>
<td>178</td>
<td>180</td>
<td>210</td>
</tr>
</tbody>
</table>

Application

LOWINOX® 22M46 stabilizer is an excellent long term stabilizer for synthetic rubbers and latexes by protecting against the effects of oxygen and heat without influencing processing or vulcanization properties. At the recommended doses, the damaging consequences of over vulcanization can be avoided. At these levels there is no tendency for blooming to occur during vulcanization and on contact with lacquered surfaces it does not cause discoloration or corona formation. In light colored vulcanizates LOWINOX® 22M46 stabilizer retards the crazing effect caused by exposure to light. Prolonged light exposure of purely white vulcanizates containing LOWINOX® 22M46 stabilizer will result in the formation of a pink tint which is masked in light colored compounds. LOWINOX® 22M46 stabilizer also has insignificant volatility with the absence of migration and so is an excellent long term stabilizer for thermoplastics such as polyoxymethylene (POM) and ABS. When used in combination with thio fatty acid esters or organic phosphites LOWINOX® 22M46 stabilizer forms synergistic systems with visibly increased effectiveness.

Food Contact

This compound has broad food contact approvals; for details please contact Addivant™ Regulatory Affairs Polymer Additives.

Handling and Storage

The use of proper protective equipment is recommended. Excess exposure to the product should be avoided. Wash thoroughly after handling. Store the product in a cool, dry, well-ventilated area away from incompatible materials. Unless otherwise stated, the shelf life of the product is 1 year when it is properly stored.

For additional handling and toxicological information consult the Addivant™ Material Safety Data Sheet.
SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers
   Product name: Acetone

   Product Number: 650501
   Brand: Sigma-Aldrich
   Index-No.: 606-001-00-8
   REACH No.: 01-2119471330-49-XXXX
   CAS-No.: 67-64-1

1.2 Relevant identified uses of the substance or mixture and uses advised against
   Identified uses: Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet
   Company: Sigma-Aldrich Chemie GmbH
   Riedstrasse 2
   D-89555 STEINHEIM

   Telephone: +49 89-6513-1444
   Fax: +49 7329-97-2319
   E-mail address: eurtechserv@sial.com

1.4 Emergency telephone number
   Emergency Phone #
   0800 181 7059 (CHEMTREC Deutschland)
   +49 (0)696 43508409 (CHEMTREC weltweit)

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture
   Classification according to Regulation (EC) No 1272/2008
   Flammable liquids (Category 2), H225
   Eye irritation (Category 2), H319
   Specific target organ toxicity - single exposure (Category 3), Central nervous system, H336

   For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 Label elements
   Labelling according Regulation (EC) No 1272/2008
   Pictogram
   Signal word: Danger
   Hazard statement(s)
   H225: Highly flammable liquid and vapour.
   H319: Causes serious eye irritation.
   H336: May cause drowsiness or dizziness.
Precautionary statement(s)
P210 Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
P280 Wear eye protection/ face protection.
P304 + P340 + P312 IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER or doctor/ physician if you feel unwell.
P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P337 + P313 If eye irritation persists: Get medical advice/ attention.
P403 + P235 Store in a well-ventilated place. Keep cool.

Supplemental Hazard information (EU)
EUH066 Repeated exposure may cause skin dryness or cracking.

2.3 Other hazards
This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

SECTION 3: Composition/information on ingredients

3.1 Substances

<table>
<thead>
<tr>
<th>Formula</th>
<th>C₃H₆O</th>
</tr>
</thead>
<tbody>
<tr>
<td>Molecular weight</td>
<td>58.08 g/mol</td>
</tr>
<tr>
<td>CAS-No.</td>
<td>67-64-1</td>
</tr>
<tr>
<td>EC-No.</td>
<td>200-662-2</td>
</tr>
<tr>
<td>Index-No.</td>
<td>606-001-00-8</td>
</tr>
<tr>
<td>Registration number</td>
<td>01-2119471330-49-XXXX</td>
</tr>
</tbody>
</table>

Hazardous ingredients according to Regulation (EC) No 1272/2008

<table>
<thead>
<tr>
<th>Component</th>
<th>Classification</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acetone</td>
<td>Flam. Liq. 2; Eye Irrit. 2; STOT SE 3; H225, H319, H336</td>
<td>&lt;= 100 %</td>
</tr>
</tbody>
</table>

CAS-No. 67-64-1
EC-No. 200-662-2
Index-No. 606-001-00-8
Registration number 01-2119471330-49-XXXX

For the full text of the H-Statements mentioned in this Section, see Section 16.

SECTION 4: First aid measures

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If swallowed
Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11.
4.3 Indication of any immediate medical attention and special treatment needed
No data available

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
Carbon oxides

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
Use water spray to cool unopened containers.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
Use personal protective equipment. Avoid breathing vapours, mist or gas. Ensure adequate ventilation.
Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapours accumulating to form explosive concentrations. Vapours can accumulate in low areas.
For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

6.3 Methods and materials for containment and cleaning up
Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations (see section 13).

6.4 Reference to other sections
For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.
Keep away from sources of ignition - No smoking. Take measures to prevent the build up of electrostatic charge.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Store in cool place. Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.
Storage class (TRGS 510): Flammable liquids

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Components with workplace control parameters

<table>
<thead>
<tr>
<th>Derived No Effect Level (DNEL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Application Area</td>
</tr>
<tr>
<td>-------------------</td>
</tr>
<tr>
<td>Workers</td>
</tr>
<tr>
<td>Consumers</td>
</tr>
<tr>
<td>Consumers</td>
</tr>
<tr>
<td>-----------</td>
</tr>
<tr>
<td>Workers</td>
</tr>
<tr>
<td>Workers</td>
</tr>
<tr>
<td>Consumers</td>
</tr>
<tr>
<td>Consumers</td>
</tr>
</tbody>
</table>

**Predicted No Effect Concentration (PNEC)**

<table>
<thead>
<tr>
<th>Compartment</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soil</td>
<td>33.3 mg/kg</td>
</tr>
<tr>
<td>Marine water</td>
<td>1.06 mg/l</td>
</tr>
<tr>
<td>Fresh water</td>
<td>10.6 mg/l</td>
</tr>
<tr>
<td>Marine sediment</td>
<td>3.04 mg/kg</td>
</tr>
<tr>
<td>Fresh water sediment</td>
<td>30.4 mg/kg</td>
</tr>
<tr>
<td>Onsite sewage treatment plant</td>
<td>100 mg/l</td>
</tr>
</tbody>
</table>

8.2 Exposure controls

**Appropriate engineering controls**
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

**Personal protective equipment**

**Eye/face protection**
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

**Skin protection**
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove’s outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

The selected protective gloves have to satisfy the specifications of EU Directive 89/686/EEC and the standard EN 374 derived from it.

- **Full contact**
  - Material: butyl-rubber
  - Minimum layer thickness: 0.3 mm
  - Break through time: 480 min
  - Material tested: Butoject® (KCL 897 / Aldrich Z677647, Size M)

- **Splash contact**
  - Material: butyl-rubber
  - Minimum layer thickness: 0.3 mm
  - Break through time: 480 min
  - Material tested: Butoject® (KCL 897 / Aldrich Z677647, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374

If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

**Body Protection**
Impervious clothing, Flame retardant antistatic protective clothing., The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

**Respiratory protection**
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type AXBEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air
respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

**Control of environmental exposure**
Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

---

### SECTION 9: Physical and chemical properties

#### 9.1 Information on basic physical and chemical properties

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Appearance</strong></td>
<td>Form: liquid, clear</td>
</tr>
<tr>
<td></td>
<td>Colour: colourless</td>
</tr>
<tr>
<td><strong>Odour</strong></td>
<td>No data available</td>
</tr>
<tr>
<td><strong>Odour Threshold</strong></td>
<td>No data available</td>
</tr>
<tr>
<td><strong>pH</strong></td>
<td>No data available</td>
</tr>
<tr>
<td><strong>Melting point/freezing point</strong></td>
<td>Melting point/range: -94 °C</td>
</tr>
<tr>
<td><strong>Initial boiling point and boiling</strong></td>
<td>56 °C at 1.013 hPa</td>
</tr>
<tr>
<td><strong>Flash point</strong></td>
<td>-16,99 °C - closed cup</td>
</tr>
<tr>
<td><strong>Evaporation rate</strong></td>
<td>No data available</td>
</tr>
<tr>
<td><strong>Flammability (solid, gas)</strong></td>
<td>No data available</td>
</tr>
<tr>
<td><strong>Upper/lower flammability or</strong></td>
<td>Upper explosion limit: 13 %(V)</td>
</tr>
<tr>
<td><strong>explosive limits</strong></td>
<td>Lower explosion limit: 2 %(V)</td>
</tr>
<tr>
<td><strong>Vapour pressure</strong></td>
<td>533,3 hPa at 39,5 °C</td>
</tr>
<tr>
<td></td>
<td>245,3 hPa at 20,0 °C</td>
</tr>
<tr>
<td><strong>Vapour density</strong></td>
<td>No data available</td>
</tr>
<tr>
<td><strong>Relative density</strong></td>
<td>0,791 g/mL at 25 °C</td>
</tr>
<tr>
<td><strong>Water solubility</strong></td>
<td>completely miscible</td>
</tr>
<tr>
<td><strong>Partition coefficient: n-octanol/water</strong></td>
<td>log Pow: -0,24</td>
</tr>
<tr>
<td><strong>Auto-ignition temperature</strong></td>
<td>465,0 °C</td>
</tr>
<tr>
<td><strong>Decomposition temperature</strong></td>
<td>No data available</td>
</tr>
<tr>
<td><strong>Viscosity</strong></td>
<td>No data available</td>
</tr>
<tr>
<td><strong>Explosive properties</strong></td>
<td>No data available</td>
</tr>
<tr>
<td><strong>Oxidizing properties</strong></td>
<td>No data available</td>
</tr>
</tbody>
</table>

#### 9.2 Other safety information

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surface tension</td>
<td>23,2 mN/m at 20,0 °C</td>
</tr>
</tbody>
</table>

---

### SECTION 10: Stability and reactivity

#### 10.1 Reactivity
No data available

#### 10.2 Chemical stability
Stable under recommended storage conditions.

#### 10.3 Possibility of hazardous reactions
No data available
10.4 **Conditions to avoid**
Heat, flames and sparks.

10.5 **Incompatible materials**
Bases, Oxidizing agents, Reducing agents, Acetone reacts violently with phosphorous oxychloride.

10.6 **Hazardous decomposition products**
Other decomposition products - No data available
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 **Information on toxicological effects**

**Acute toxicity**
LD50 Oral - Rat - 5.800 mg/kg

LC50 Inhalation - Rat - 8 h - 50.100 mg/m3
Remarks: Drowsiness Dizziness Unconsciousness

LD50 Dermal - Guinea pig - 7.426 mg/kg

**Skin corrosion/irritation**
Skin - Rabbit
Result: Mild skin irritation - 24 h

**Serious eye damage/eye irritation**
Eyes - Rabbit
Result: Eye irritation - 24 h

**Respiratory or skin sensitisation**
- Guinea pig
Result: Does not cause skin sensitisation.

**Germ cell mutagenicity**
No data available

**Carcinogenicity**
This product is or contains a component that is not classifiable as to its carcinogenicity based on its IARC, ACGIH, NTP, or EPA classification.

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

**Reproductive toxicity**
No data available

**Specific target organ toxicity - single exposure**
May cause drowsiness or dizziness.

**Specific target organ toxicity - repeated exposure**
No data available

**Aspiration hazard**
No data available

**Additional Information**
RTECS: AL3150000
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Kidney - Irregularities - Based on Human Evidence
Skin - Dermatitis - Based on Human Evidence
SECTION 12: Ecological information

12.1 Toxicity
   Toxicity to fish            LC50 - Oncorhynchus mykiss (rainbow trout) - 5.540 mg/l - 96 h
   Toxicity to daphnia and other aquatic invertebrates LC50 - Daphnia magna (Water flea) - 8.800 mg/l - 48 h
   Toxicity to algae          Remarks: No data available

12.2 Persistence and degradability
   Biodegradability          Result: 91 % - Readily biodegradable (OECD Test Guideline 301B)

12.3 Bioaccumulative potential
   Does not bioaccumulate.

12.4 Mobility in soil
   No data available

12.5 Results of PBT and vPvB assessment
   This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

12.6 Other adverse effects
   No data available

SECTION 13: Disposal considerations

13.1 Waste treatment methods
   Product
   Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Offer surplus and non-recyclable solutions to a licensed disposal company.

   Contaminated packaging
   Dispose of as unused product.

SECTION 14: Transport information

14.1 UN number
   ADR/RID: 1090              IMDG: 1090                         IATA: 1090

14.2 UN proper shipping name
   ADR/RID: ACETONE
   IMDG: ACETONE
   IATA: Acetone

14.3 Transport hazard class(es)
   ADR/RID: 3                IMDG: 3                              IATA: 3

14.4 Packaging group
   ADR/RID: II               IMDG: II                             IATA: II

14.5 Environmental hazards
   ADR/RID: no               IMDG Marine pollutant: no            IATA: no

14.6 Special precautions for user
   No data available

SECTION 15: Regulatory information
15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture

This safety datasheet complies with the requirements of Regulation (EC) No. 1907/2006.

15.2 Chemical Safety Assessment

A Chemical Safety Assessment has been carried out for this substance.

SECTION 16: Other information

Full text of H-Statements referred to under sections 2 and 3.

EUH066 Repeated exposure may cause skin dryness or cracking.
H225 Highly flammable liquid and vapour.
H319 Causes serious eye irritation.
H336 May cause drowsiness or dizziness.

Further information

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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.
SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers
   Product name : Nitric acid

   Product Number : 309079
   Brand : Sigma-Aldrich
   REACH No. : A registration number is not available for this substance as the substance or its uses are exempted from registration, the annual tonnage does not require a registration or the registration is envisaged for a later registration deadline.

   CAS-No. : 7697-37-2

1.2 Relevant identified uses of the substance or mixture and uses advised against
   Identified uses : Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet
   Company : Sigma-Aldrich Chemie GmbH
   Riedstrasse 2
   D-89555 STEINHEIM

   Telephone : +49 89-6513-1444
   Fax : +49 7329-97-2319
   E-mail address : eurtechserv@sial.com

1.4 Emergency telephone number
   Emergency Phone # : 0800 181 7059 (CHEMTREC Deutschland)
   +49 (0)696 43508409 (CHEMTREC weltweit)

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture
   Classification according to Regulation (EC) No 1272/2008
   | Oxidizing liquids (Category 2), H272
   | Corrosive to metals (Category 1), H290
   | Acute toxicity, Inhalation (Category 3), H331
   | Acute toxicity, Dermal (Category 3), H311
   | Skin corrosion (Category 1A), H314

   For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 Label elements
   Labelling according Regulation (EC) No 1272/2008
   | Pictogram
   | Signal word : Danger
   | Hazard statement(s) : May intensify fire; oxidizer.
Precautionary statement(s)
P210 Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
P220 Keep/Store away from clothing/ combustible materials.
P280 Wear protective gloves/ protective clothing/ eye protection/ face protection.
P303 + P361 + P353 IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.
P304 + P340 + P310 IF INHALED: Remove person to fresh air and keep comfortable for breathing. Immediately call a POISON CENTER or doctor/ physician.
P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

Supplemental Hazard information (EU)
EUH071 Corrosive to the respiratory tract.

2.3 Other hazards
This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

SECTION 3: Composition/information on ingredients

3.2 Mixtures
Formula: HNO₃
Molecular weight: 63.01 g/mol

Hazardous ingredients according to Regulation (EC) No 1272/2008

<table>
<thead>
<tr>
<th>Component</th>
<th>Classification</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nitric acid</td>
<td>Ox. Liq. 2; Met. Corr. 1; Skin Corr. 1A; H272, H290, H314</td>
<td>&gt;= 90 - &lt;= 100 %</td>
</tr>
<tr>
<td>CAS-No. 7697-37-2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EC-No. 231-714-2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Index-No. 007-004-00-1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dinitrogen trioxide</td>
<td>Ox. Gas 1; Press. Gas Compr. Gas; Acute Tox. 2; Skin Corr. 1B; H270, H280, H330, H310, H314</td>
<td>&gt;= 10 - &lt; 20 %</td>
</tr>
<tr>
<td>CAS-No. 10544-73-7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EC-No. 234-128-5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

For the full text of the H-Statements mentioned in this Section, see Section 16.

SECTION 4: First aid measures

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.
If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Take off contaminated clothing and shoes immediately. Wash off with soap and plenty of water. Take victim immediately to hospital. Consult a physician.

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If swallowed
Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

SECTION 5: Firefighting measures

5.1 Extinguishing media
Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
Nitrogen oxides (NOx)

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
Use water spray to cool unopened containers.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
Wear respiratory protection. Avoid breathing vapours, mist or gas. Ensure adequate ventilation.
Evacuate personnel to safe areas.
For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

6.3 Methods and materials for containment and cleaning up
Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations (see section 13).

6.4 Reference to other sections
For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.
Keep away from sources of ignition - No smoking. Keep away from heat and sources of ignition.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Store in cool place. Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.
Storage class (TRGS 510): Strongly oxidizing hazardous materials

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated
SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Components with workplace control parameters

8.2 Exposure controls

Appropriate engineering controls
Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product.

Personal protective equipment

Eye/face protection
Tightly fitting safety goggles. Faceshield (8-inch minimum). Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove’s outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

The selected protective gloves have to satisfy the specifications of EU Directive 89/686/EEC and the standard EN 374 derived from it.

Full contact
Material: Fluorinated rubber
Minimum layer thickness: 0.7 mm
Break through time: 480 min
Material tested: Vitoject® (KCL 890 / Aldrich Z677698, Size M)

Splash contact
Material: Nature latex/chloroprene
Minimum layer thickness: 0.6 mm
Break through time: 120 min
Material tested: Lapren® (KCL 706 / Aldrich Z677558, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Complete suit protecting against chemicals. The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains.
### SECTION 9: Physical and chemical properties

#### 9.1 Information on basic physical and chemical properties

- **a)** Appearance  
  Form: clear, liquid  
  Colour: colourless
- **b)** Odour  
  No data available
- **c)** Odour Threshold  
  No data available
- **d)** pH  
  $< 1$ at $20$ °C
- **e)** Melting point/freezing point  
  No data available
- **f)** Initial boiling point and boiling range  
  $100$ °C at $1.013$ hPa
- **g)** Flash point  
  No data available
- **h)** Evaporation rate  
  No data available
- **i)** Flammability (solid, gas)  
  No data available
- **j)** Upper/lower flammability or explosive limits  
  No data available
- **k)** Vapour pressure  
  $11$ hPa at $20$ °C
- **l)** Vapour density  
  No data available
- **m)** Relative density  
  $1.48$ g/cm$^3$ at $20$ °C
- **n)** Water solubility  
  completely miscible
- **o)** Partition coefficient: n-octanol/water  
  No data available
- **p)** Auto-ignition temperature  
  No data available
- **q)** Decomposition temperature  
  No data available
- **r)** Viscosity  
  No data available
- **s)** Explosive properties  
  No data available
- **t)** Oxidizing properties  
  No data available

#### 9.2 Other safety information

No data available

### SECTION 10: Stability and reactivity

#### 10.1 Reactivity

No data available

#### 10.2 Chemical stability

Stable under recommended storage conditions.

#### 10.3 Possibility of hazardous reactions

No data available

#### 10.4 Conditions to avoid

No data available

#### 10.5 Incompatible materials

Acids, Reducing agents, Alcohols, Acetic anhydride, Acrylonitrile, Acetonitrile, Organic materials, Alkali metals
10.6 Hazardous decomposition products
Other decomposition products - No data available
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
No data available
Inhalation: No data available
Dermal: No data available

Skin corrosion/irritation
No data available

Serious eye damage/eye irritation
No data available

Respiratory or skin sensitisation
No data available

Germ cell mutagenicity
No data available

Carcinogenicity
IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

Reproductive toxicity
No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

Additional Information
RTECS: QU5900000
burning sensation, Cough, wheezing, laryngitis, Shortness of breath, spasm, inflammation and edema of the larynx, spasm, inflammation and edema of the bronchi, pneumonitis, pulmonary edema. Material is extremely destructive to tissue of the mucous membranes and upper respiratory tract, eyes, and skin. To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.
Liver - Irregularities - Based on Human Evidence

SECTION 12: Ecological information

12.1 Toxicity
No data available

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available
12.5 Results of PBT and vPvB assessment
This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

12.6 Other adverse effects
No data available

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product
Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Offer surplus and non-recyclable solutions to a licensed disposal company.

Contaminated packaging
Dispose of as unused product.

SECTION 14: Transport information

14.1 UN number
ADR/RID: 2032
IMDG: 2032
IATA: 2032

14.2 UN proper shipping name
ADR/RID: NITRIC ACID, RED FUMING
IMDG: NITRIC ACID, RED FUMING
IATA: Nitric acid, red fuming
Passenger Aircraft: Not permitted for transport
Cargo Aircraft: Not permitted for transport

14.3 Transport hazard class(es)
ADR/RID: 8 (5.1, 6.1)
IMDG: 8 (5.1, 6.1)
IATA: 8 (5.1, 6.1)

14.4 Packaging group
ADR/RID: I
IMDG: I
IATA: -

14.5 Environmental hazards
ADR/RID: no
IMDG Marine pollutant: no
IATA: no

14.6 Special precautions for user
No data available

SECTION 15: Regulatory information

This safety datasheet complies with the requirements of Regulation (EC) No. 453/2010.

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture

15.2 Chemical Safety Assessment
For this product a chemical safety assessment was not carried out

SECTION 16: Other information

Full text of H-Statements referred to under sections 2 and 3.

EUH071 Corrosive to the respiratory tract.
H270 May cause or intensify fire; oxidizer.
H272 May intensify fire; oxidizer.
H280 Contains gas under pressure; may explode if heated.
H290 May be corrosive to metals.
H310 Fatal in contact with skin.
H311 Toxic in contact with skin.
H311 + H331 Toxic in contact with skin or if inhaled.
H314  Causes severe skin burns and eye damage.
H315  Causes skin irritation.
H318  Causes serious eye damage.
H319  Causes serious eye irritation.
H330  Fatal if inhaled.
H331  Toxic if inhaled.

**Further information**
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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.
MATERIAL SAFETY DATA SHEET (MSDS)
AMMONIA

(Please ensure that this MSDS is received by the appropriate person)

DATE: September 2015   Version 3
Ref. No.: MS025

1 PRODUCT AND COMPANY IDENTIFICATION

Product Name Ammonia
Chemical Formula NH₃
Trade name Ammonia
Colour coding Silver body with a Red(A.11) circle below the valve, and a yellow band immediately below the red circle
Valve CGA240-3/8 inch – 18 NGT right hand female
Company Identification African Oxygen Limited
23 Webber Street
Johannesburg, 2001
Tel. No: (011) 490-0400
Fax No: (011) 490-0506

EMERGENCY NUMBER 0860111185 or (011) 873 4382
(24 hours)

2 COMPOSITION/INFORMATION ON INGREDIENTS

Chemical Name Ammonia
Chemical family Corrosive, caustic, reactive gas
Synonyms Anhydrous ammonia, R717
CAS No. 7664-41-7
UN No. 1005
ERG No. 125
Hazchem Warning Corrosive toxic gas

3 HAZARDS IDENTIFICATION

Main Hazards Irritating or corrosive to exposed tissues. Inhalation of vapours may result in pulmonary oedema and chemical pneumonitis. Contact with liquid product may cause frostbite or freeze burns, in exposed tissues. All cylinders are portable gas containers and must be regarded as pressure vessels at all times.

Adverse Health Effects. Inhalation of high concentrations produces violent coughing due to the local action on the respiratory tract. If rapid escape is not possible, severe lung irritation, pulmonary oedema and death can result. Lower concentrations cause eye irritation, laryngitis and bronchitis.

Biological Hazards. Because of its alkaline properties, long-term exposure to flora can cause damage. Aquatic fauna can also be affected should the pH of their environment change due to long-term exposure to high concentrations of ammonia.

Vapour Inhalation. Ammonia acts principally on the upper respiratory tract, where it exerts an alkaline, caustic action. It produces respiratory reflexes such as coughing and arrest of respiration. It affects the conjunctiva and cornea immediately. Inhalation causes acute inflammation of the respiratory organs, coughing, oedema of the lungs, chronic bronchial catarrh, secretion of saliva and retention of urine.

Eye Contact Exposure to high gas concentrations may cause temporary blindness and severe eye damage. Direct contact of the eyes with liquid anhydrous ammonia will produce serious eye burns.

Skin Contact Liquid anhydrous ammonia produces skin burns on contact.

Ingestion Swallowing of the liquid results in severe corrosive action of the mouth, throat, and stomach.

Labelling Elements:

Hazard Pictograms:

Signal Word: Danger
Hazard Statements:
H221: Flammable gas
H331: Toxic if inhaled
H34: Causes severe skin burns and eye damage
H400: Very toxic to aquatic life

Precautionary Statements:

(SEE FIRST AID MEASURES SECTION FOR TREATMENTS)
P260: Do not breathe gas/vapours
P262: Do not get in eyes, on skin, or on clothing
P264: Wash hands thoroughly after handling
P271: Use only outdoors or in a well ventilates area
P273: Avoid release to the environment
P301: Collect spillage
P284: Wear respiratory protection
P304+P340: IF INHALED: remove to fresh air and keep at rest in a position comfortable for breathing
P310: Immediately call a POISON CENTRE or doctor/physician
P320: Specific treatment is urgent (see first aid measures section)
P301+P330+P331: IF SWALLOWED: Rinse mouth. Do not induce vomiting
P303+P361+P353: IF ON SKIN (or hair): Immediately remove or take off all contaminated clothing. Immediately rinse skin with water/shower
P363: Wash contaminated clothing before re-use.
P305+P351+P338: IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do so. Continue rinsing.
P377: Leaking gas fire: Do not extinguish, unless leak can be stopped safely.
P401: Store in accordance with national regulations
P403+233: Store in a well ventilated place and keep container tightly closed
P405: Store locked up
P501: Do not dispose contents/container to storm water drains, treat as hazardous waste.
4 FIRST AID MEASURES

Prompt medical attention is mandatory in all cases of overexposure. Rescue personnel should be equipped with self-contained breathing apparatus. Any conscious person who has inhaled ammonia causing irritation should be assisted to an uncontaminated area and inhale fresh air. A person overcome by ammonia should immediately be carried to an uncontaminated area. If breathing has ceased, artificial respiration must be started immediately, preferably by trained personnel. If breathing is weak or has been restored by artificial respiration, oxygen may be administered. Summon a physician immediately for anyone who has been burned or overcome by ammonia. Until a physician arrives, and after having accomplished a thorough removal of ammonia as possible, keep the patient warm and quiet, and take such specific action as may be indicated.

**Inhalation**

The conscious person who has inhaled a concentration of ammonia which causes irritation effects should go to an uncontaminated area and inhale fresh air or oxygen. Eye, nose and throat irritation should be treated by an ophthalmologist. If liquid anhydrous ammonia has been swallowed, call a physician immediately. If the patient is conscious and able, he should drink large amounts of water to dilute the chemical. Do not induce vomiting if the patient is in shock, extreme pain or is unconscious. If vomiting begins, place the patient face down with head lower than hips; this prevents vomit from entering the lungs and causing further injury.

**Eye Contact**

Persons with potential exposure to ammonia should not wear contact lenses. Call a physician at once. Immediately begin irrigation of the eyes with copious amounts of clean water while holding the eyelids apart. Continue irrigation for 15 minutes. Repeat this procedure every 10 minutes for an hour, each time irrigating for a period of 5 minutes. If readily available, a 5% boric acid solution may be used instead of water, but irritation must not be delayed while such a solution is sought or prepared. Prompt and thorough irrigation is of primary importance. Any standard anaesthetic solution for ophthalmic use ordered by the physician may be instilled for control of severe pain, but only after the 15 minute period of irrigation has been completed. Continuous cold boric acid compresses should be used for cases of severe injury, in addition to irrigation. No oils or ointments should be instilled until after the eye has been examined by a qualified physician, and then only as prescribed by him. Ulcers of the cornea should be treated by an ophthalmologist.

**Skin Contact**

If skin contact is extensive and emergency showers available, the victim should get under the emergency shower immediately. Contaminated clothing and shoes should be removed under the shower. In other cases, the affected areas should be washed thoroughly with large amounts of running water for at least 15 minutes. Do not apply salves or ointments or cover burns with dressing; however, protect the injured area with a clean cloth prior to medical care. Do not attempt to neutralise the ammonia. Subsequent medical treatment is otherwise the same as for thermal burns.

**Inhalation**

The conscious person who has inhaled a concentration of ammonia which causes irritation effects should go to an uncontaminated area and inhale fresh air or oxygen. If the exposure has been to minor concentrations for a limited time, usually no treatment will be required. A worker overcome by ammonia must be carried to an uncontaminated atmosphere and, if breathing is laboured or has ceased, given artificial respiration (back-pressure, arm lift, or mouth-to-mouth resuscitation) immediately, preferably by trained personnel. When breathing has been restored, 100% oxygen is administered, but not for more than 1 hour of continuous treatment at one time. Oxygen therapy may be interrupted after 1 hour, and re instituted as the clinical condition indicates. Observe for laryngeal spasm and perform tracheotomy if indicated. In case of severe exposure, the patient should breathe 100% oxygen under positive exhalation pressure (4cm) for one-half hour periods every hour. Treatment may be continued in this way until symptoms subside or other clinical indications for interruption appear.

**Contact with nose & throat.** Irrigate the nose and mouth continuously for 15 minutes. If the patient can swallow, encourage him to drink large quantities of 0.5% citric acid solution or lemonade. Never give anything by mouth to an unconscious person.

Ingestion

If liquid anhydrous ammonia has been swallowed, call a physician immediately. If the patient is conscious and able, he should drink large amounts of water to dilute the chemical. Do not induce vomiting if the patient is in shock, extreme pain or is unconscious. If vomiting begins, place the patient face down with head lower than hips; this prevents vomit from entering the lungs and causing further injury.

5 FIRE FIGHTING MEASURES

**Extinguishing media.** Fog-water spray. (In the absence of fog equipment, a fine spray of water may be used.) Use media suitable for surrounding fire. Although ammonia does not represent a serious flammability hazard, mixtures of air and ammonia containing from 15% to 28% ammonia vapour by volume will ignite when sparked, or exposed to temperatures exceeding 651°C.

**Specific Hazards**

High levels of ammonia can produce corrosive effects on tissues and can cause laryngeal and bronchial spasm and oedema so as to obstruct breathing.

**Emergency Actions.** Rescue personnel should be equipped with self-contained breathing apparatus. If possible, stop the flow of gas. Since ammonia is soluble in water, it is the best extinguishing media - not only in extinguishing the fire, but also absorbing the escaped ammonia gas. Evacuate the area. All cylinders should be removed from the vicinity of the fire. Cylinders that cannot be removed should be cooled with water from a safe distance. Cylinders which have been exposed to excessive heat should be clearly identified and returned to the supplier. CONTACT THE NEAREST AFROX BRANCH.

**Protective Clothing.** Self-contained breathing apparatus. Safety gloves, Goggles and shoes, or boots, should be worn when handling cylinders.

**Environmental precautions.** As the gas is lighter than air, ensure that it is not trapped in confined spaces. Knock down pockets of gas with fogwater spray, and ventilate the area using forced-draft if necessary. Prevent from entering sewers and drains.

6 ACCIDENTAL RELEASE MEASURES

**Personal Precautions.** Personnel working with anhydrous ammonia should be thoroughly familiar with safety precautions for handling a gas corrosive to human tissue as well as measures...
MATERIAL SAFETY DATA SHEET (MSDS)

AMMONIA

(Please ensure that this MSDS is received by the appropriate person)

10 STABILITY AND REACTIVITY

Conditions to avoid. Heating of cylinders, as the increase in pressure bears a direct relationship to increase in temperature. When the gas is exposed to temperatures in the range 449°C at 101,329kPa, dissociation will occur, with the release of nitrogen and hydrogen. The hydrogen could then form explosive gas/air mixtures. Never use cylinders as rollers or supports, or for any other purpose than the storage of ammonia.

Incompatible Materials. Most common metals are not affected by dry ammonia. However, when combined with water vapour, ammonia will attack copper, zinc, or alloys containing copper as a major alloying element. Therefore, these materials should not be used in contact with ammonia.

11 TOXICOLOGICAL INFORMATION

Acute Toxicity Ammonia is not a systemic poison

Skin & eye contact Severe irritant

Chronic Toxicity Chronic irritation to the eyes, nose, and upper respiratory tract may result from repeated exposure to the vapours.

Carcinogenicity: No known effect.

Mutagenicity: Genetic mutations observed in bacterial and mammalian test systems.

Reproductive Hazards: No known effect

National Legislation: None

(Further information see Section 3. Adverse Health Effects)

12 ECOLOGICAL INFORMATION

Ammonia gas can cause damage to the ecology due to its high alkalinity and affinity for water. pH changes can occur in the immediate environs of a spill which could affect both flora and fauna.

13 DISPOSAL CONSIDERATIONS

Disposal Methods. Ammonia may be disposed of by discharge into water of sufficient volume to absorb it. Disposal of the resultant ammonium hydroxide, including and subsequent neutralisation products, must be done in an environmentally safe manner that, for example, will not be harmful to aquatic life. Large amounts should only be handled by the gas supplier.

14 TRANSPORT INFORMATION

ROAD TRANSPORTATION

UN No. 1005

Class 2.3 Toxic gas

Subsidiary risk Corrosive, inhalation hazard

ERG No 125

Hazard warning Toxic gas

SEA TRANSPORTATION

IMDG 1005

Class 2.3

Label Toxic gas

AIR TRANSPORTATION

ICAO/IATA Code 1005

Class 2.3

Subsidiary risk Toxic, corrosive gas

Packaging group - Cargo 200

- Passenger Forbidden

Maximum quantity allowed - Cargo 25Kg

- Passenger Forbidden

15 REGULATORY INFORMATION

GHS Hazard class: Flam gas 2

Acute tox 3

(Inhalation)
16 OTHER INFORMATION

Bibliography
Compressed Gas Association, Arlington, Virginia
Handbook of Compressed Gases - 3rd Edition
SANS 10265 - Labelling of Dangerous Substances

17 EXCLUSION OF LIABILITY

Information contained in this publication is accurate at the date of publication. The company does not accept liability arising from the use of this information, or the use, application, adaptation or process of any products described herein.
SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers
Product name: Hydrochloric acid

Product Number: H1758
Brand: Sigma
Index-No.: 017-002-01-X
REACH No.: 01-2119484862-27-XXXX
CAS-No.: 7647-01-0

1.2 Relevant identified uses of the substance or mixture and uses advised against
Identified uses: Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet
Company: Sigma-Aldrich Chemie GmbH
Riedstrasse 2
D-89555 STEINHEIM

Telephone: +49 89-6513-1444
Fax: +49 7329-97-2319
E-mail address: eurtechserv@sial.com

1.4 Emergency telephone number
Emergency Phone #
0800 181 7059 (CHEMTREC Deutschland)
+49 (0)696 43508409 (CHEMTREC weltweit)

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture
Classification according to Regulation (EC) No 1272/2008
Corrosive to metals (Category 1), H290
Skin corrosion (Category 1B), H314
Specific target organ toxicity - single exposure (Category 3), Respiratory system, H335

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 Label elements
Labelling according Regulation (EC) No 1272/2008
Pictogram

Signal word: Danger
Hazard statement(s)
H290: May be corrosive to metals.
H314: Causes severe skin burns and eye damage.
H335: May cause respiratory irritation.
Precautionary statement(s)  
P260 Do not breathe dust/ fume/ gas/ mist/ vapours/ spray.  
P280 Wear protective gloves/ protective clothing/ eye protection/ face protection.  
P303 + P361 + P353 IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.  
P304 + P340 + P310 IF INHALED: Remove person to fresh air and keep comfortable for breathing. Immediately call a POISON CENTER/doctor.  
P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.  

Supplemental Hazard Statements  
none

2.3 Other hazards  
This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

SECTION 3: Composition/information on ingredients

3.2 Mixtures  
Formula : HCl  
Molecular weight : 36,46 g/mol  

Hazardous ingredients according to Regulation (EC) No 1272/2008

<table>
<thead>
<tr>
<th>Component</th>
<th>Classification</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydrochloric acid</td>
<td>Met. Corr. 1; Skin Corr. 1B; STOT SE 3; H290, H314, H335</td>
<td>&gt;= 30 - &lt; 50 %</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CAS-No.</th>
<th>7647-01-0</th>
</tr>
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<tr>
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<td>231-595-7</td>
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<tr>
<td>Index-No.</td>
<td>017-002-01-X</td>
</tr>
<tr>
<td>Registration number</td>
<td>01-2119484862-27-XXXX</td>
</tr>
</tbody>
</table>

Concentration limits:


For the full text of the H-Statements mentioned in this Section, see Section 16.

SECTION 4: First aid measures

4.1 Description of first aid measures  

General advice  
Consult a physician. Show this safety data sheet to the doctor in attendance.  

If inhaled  
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.  

In case of skin contact  
Take off contaminated clothing and shoes immediately. Wash off with soap and plenty of water. Consult a physician.  

In case of eye contact  
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.  

If swallowed  
Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.
4.2 Most important symptoms and effects, both acute and delayed  
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed  
No data available

SECTION 5: Firefighting measures

5.1 Extinguishing media  
Suitable extinguishing media  
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture  
No data available

5.3 Advice for firefighters  
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information  
No data available

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures  
Wear respiratory protection. Avoid breathing vapours, mist or gas. Ensure adequate ventilation.  
Evacuate personnel to safe areas.  
For personal protection see section 8.

6.2 Environmental precautions  
Do not let product enter drains.

6.3 Methods and materials for containment and cleaning up  
Soak up with inert absorbent material and dispose of as hazardous waste. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections  
For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling  
Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.  
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities  
Store in cool place. Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.

7.3 Specific end use(s)  
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

SECTION 8: Exposure controls/personal protection

8.1 Control parameters  
Components with workplace control parameters

8.2 Exposure controls  
Appropriate engineering controls  
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.
Personal protective equipment

Eye/face protection
Tightly fitting safety goggles. Faceshield (8-inch minimum). Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

The selected protective gloves have to satisfy the specifications of EU Directive 89/686/EEC and the standard EN 374 derived from it.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0,11 mm
Break through time: 480 min
Material tested: Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0,11 mm
Break through time: 480 min
Material tested: Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374

If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Do not let product enter drains.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a) Appearance Form: liquid
   Colour: light yellow

b) Odour pungent

c) Odour Threshold No data available

d) pH No data available

e) Melting point/freezing point -30 °C

f) Initial boiling point and boiling range > 100 °C - lit.
g) Flash point Not applicable
h) Evaporation rate No data available
i) Flammability (solid, gas) No data available
j) Upper/lower flammability or explosive limits No data available
k) Vapour pressure 227 hPa at 21,1 °C
547 hPa at 37,7 °C
l) Vapour density No data available
m) Relative density 1,2 g/cm3 at 25 °C
n) Water solubility soluble
o) Partition coefficient: n-octanol/water No data available
p) Auto-ignition temperature No data available
q) Decomposition temperature No data available
r) Viscosity No data available
s) Explosive properties No data available
t) Oxidizing properties No data available

9.2 Other safety information
No data available

SECTION 10: Stability and reactivity

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
No data available

10.5 Incompatible materials
Bases, Amines, Alkali metals, Metals, permanganates, e.g. potassium permanganate, Fluorine, metal acetylides, hexalithium disilicide

10.6 Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Hydrogen chloride gas
Other decomposition products - No data available
Hazardous decomposition products formed under fire conditions. - Hydrogen chloride gas
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
No data available (Hydrochloric acid)

Inhalation: Inhalation may provoke the following symptoms: Respiratory irritation Cough Difficulty in breathing Pneumonia (Hydrochloric acid)
Skin corrosion/irritation
Skin - Rabbit (Hydrochloric acid)
Result: Causes burns.

Serious eye damage/eye irritation
Eyes - Rabbit (Hydrochloric acid)
Result: Corrosive to eyes

Respiratory or skin sensitisation
Did not cause sensitisation on laboratory animals. (Hydrochloric acid)

Germ cell mutagenicity
No data available (Hydrochloric acid)

Carcinogenicity
This product is or contains a component that is not classifiable as to its carcinogenicity based on its IARC, ACGIH, NTP, or EPA classification. (Hydrochloric acid)

IARC: 3 - Group 3: Not classifiable as to its carcinogenicity to humans (Hydrochloric acid)

Reproductive toxicity
No data available (Hydrochloric acid)

Specific target organ toxicity - single exposure
The substance or mixture is classified as specific target organ toxicant, single exposure, category 3 with respiratory tract irritation. (Hydrochloric acid)

Specific target organ toxicity - repeated exposure
The substance or mixture is not classified as specific target organ toxicant, repeated exposure.

Aspiration hazard
No aspiration toxicity classification (Hydrochloric acid)

Additional Information
RTECS: MW4025000

Inhalation of vapors may cause: burning sensation, Cough, wheezing, Shortness of breath, spasm, inflammation and edema of the larynx, spasm, inflammation and edema of the bronchi, pneumonitis, pulmonary edema (Hydrochloric acid)

SECTION 12: Ecological information

12.1 Toxicty
Toxicity to fish
LC50 - Lepomis macrochirus (Bluegill) - 24,6 mg/l - 96 h (Hydrochloric acid)

Toxicity to daphnia and other aquatic invertebrates
EC50 - Daphnia magna (Water flea) - 4,91 mg/l - 48 h (Hydrochloric acid)

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available (Hydrochloric acid)

12.5 Results of PBT and vPvB assessment
This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

12.6 Other adverse effects
May be harmful to aquatic organisms due to the shift of the pH. Do not empty into drains.
SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product
Offer surplus and non-recyclable solutions to a licensed disposal company.

Contaminated packaging
Dispose of as unused product.

SECTION 14: Transport information

14.1 UN number
ADR/RID: 1789   IMDG: 1789   IATA: 1789

14.2 UN proper shipping name
ADR/RID: HYDROCHLORIC ACID   IMDG: HYDROCHLORIC ACID   IATA: Hydrochloric acid

14.3 Transport hazard class(es)
ADR/RID: 8   IMDG: 8   IATA: 8

14.4 Packaging group
ADR/RID: II   IMDG: II   IATA: II

14.5 Environmental hazards
ADR/RID: no   IMDG Marine pollutant: no   IATA: no

14.6 Special precautions for user
No data available

SECTION 15: Regulatory information

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture
This safety datasheet complies with the requirements of Regulation (EC) No. 1907/2006.

15.2 Chemical safety assessment
For this product a chemical safety assessment was not carried out

SECTION 16: Other information

Full text of H-Statements referred to under sections 2 and 3.

H290      May be corrosive to metals.
H314      Causes severe skin burns and eye damage.
H315      Causes skin irritation.
H319      Causes serious eye irritation.
H335      May cause respiratory irritation.

Further information
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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.
1. Identification

Product Name: Sodium dichromate dihydrate
Cat No.: S258-3; S258-4; S258-5
Synonyms: Sodium dichromate
Recommended Use: Laboratory chemicals.
Uses advised against: Not for food, drug, pesticide or biocidal product use

2. Hazard(s) Identification

Classification
This chemical is considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200)

<table>
<thead>
<tr>
<th>Hazard</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oxidizing solids</td>
<td>Category 2</td>
</tr>
<tr>
<td>Acute oral toxicity</td>
<td>Category 3</td>
</tr>
<tr>
<td>Acute dermal toxicity</td>
<td>Category 4</td>
</tr>
<tr>
<td>Acute Inhalation Toxicity - Dusts and Mists</td>
<td>Category 2</td>
</tr>
<tr>
<td>Skin Corrosion/irritation</td>
<td>Category 1 B</td>
</tr>
<tr>
<td>Serious Eye Damage/Eye Irritation</td>
<td>Category 1</td>
</tr>
<tr>
<td>Respiratory Sensitization</td>
<td>Category 1</td>
</tr>
<tr>
<td>Skin Sensitization</td>
<td>Category 1</td>
</tr>
<tr>
<td>Germ Cell Mutagenicity</td>
<td>Category 1B</td>
</tr>
<tr>
<td>Carcinogenicity</td>
<td>Category 1B</td>
</tr>
<tr>
<td>Reproductive Toxicity</td>
<td>Category 1B</td>
</tr>
<tr>
<td>Specific target organ toxicity (single exposure)</td>
<td>Category 3</td>
</tr>
<tr>
<td>Target Organs - Respiratory system.</td>
<td></td>
</tr>
<tr>
<td>Specific target organ toxicity - (repeated exposure)</td>
<td>Category 1</td>
</tr>
<tr>
<td>Target Organs - Liver, Kidney, Blood.</td>
<td></td>
</tr>
</tbody>
</table>

Label Elements

Signal Word: Danger

Hazard Statements
May intensify fire; oxidizer
Sodium dichromate dihydrate

Toxic if swallowed
Harmful in contact with skin
Causes severe skin burns and eye damage
May cause respiratory irritation
May cause an allergic skin reaction
Fatal if inhaled
May cause allergy or asthma symptoms or breathing difficulties if inhaled
May cause genetic defects
May cause cancer
May damage fertility. May damage the unborn child
Causes damage to organs through prolonged or repeated exposure

Precautionary Statements

Prevention
Obtain special instructions before use
Do not handle until all safety precautions have been read and understood
Use personal protective equipment as required
Wash face, hands and any exposed skin thoroughly after handling
Do not eat, drink or smoke when using this product
Do not breathe dust/fume/gas/mist/vapors/spray
Use only outdoors or in a well-ventilated area
Wear respiratory protection
In case of inadequate ventilation wear respiratory protection
Contaminated work clothing should not be allowed out of the workplace
Wear protective gloves
Keep away from heat/sparks/open flames/hot surfaces. - No smoking
Keep/Store away from clothing/ other combustible materials
Take any precaution to avoid mixing with combustibles

Response
Immediately call a POISON CENTER or doctor/physician

Inhalation
IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing
Skin
Wash contaminated clothing before reuse
IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower
If skin irritation or rash occurs: Get medical advice/attention
Eyes
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
Ingestion
Rinse mouth
Do NOT induce vomiting
Fire
In case of fire: Use CO2, dry chemical, or foam for extinction
Storage
Store locked up
Store in a well-ventilated place. Keep container tightly closed
Disposal
Dispose of contents/container to an approved waste disposal plant

Hazards not otherwise classified (HNOC)
Very toxic to aquatic life with long lasting effects
WARNING! This product contains a chemical known in the State of California to cause cancer, birth defects or other reproductive harm.
### 3. Composition / Information on Ingredients

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS-No</th>
<th>Weight %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sodium dichromate dihydrate</td>
<td>7789-12-0</td>
<td>&gt;95</td>
</tr>
<tr>
<td>Sodium dichromate</td>
<td>10588-01-9</td>
<td>-</td>
</tr>
</tbody>
</table>

### 4. First-aid measures

**General Advice**
Immediate medical attention is required. Show this safety data sheet to the doctor in attendance.

**Eye Contact**
Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Immediate medical attention is required.

**Skin Contact**
Wash off immediately with plenty of water for at least 15 minutes. Immediate medical attention is required.

**Inhalation**
Move to fresh air. If breathing is difficult, give oxygen. Do not use mouth-to-mouth method if victim ingested or inhaled the substance; give artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device. Immediate medical attention is required.

**Ingestion**
Do not induce vomiting. Call a physician or Poison Control Center immediately.

**Most important symptoms/effects**
Causes burns by all exposure routes. May cause allergy or asthma symptoms or breathing difficulties if inhaled. May cause allergic skin reaction. Use of gastric lavage or emesis is contraindicated. Possible perforation of stomach or esophagus should be investigated: Ingestion causes severe swelling, severe damage to the delicate tissue and danger of perforation: Symptoms of allergic reaction may include rash, itching, swelling, trouble breathing, tingling of the hands and feet, dizziness, lightheadedness, chest pain, muscle pain or flushing

**Notes to Physician**
Treat symptomatically

### 5. Fire-fighting measures

**Unsuitable Extinguishing Media**
No information available

**Flash Point**
No information available

**Method -**
No information available

**Autoignition Temperature**

**Explosion Limits**

**Upper**
No data available

**Lower**
No data available

**Oxidizing Properties**
Oxidizer

**Sensitivity to Mechanical Impact**
No information available

**Sensitivity to Static Discharge**
No information available

**Specific Hazards Arising from the Chemical**
The product causes burns of eyes, skin and mucous membranes. Oxidizer: Contact with combustible/organic material may cause fire. May ignite combustibles (wood paper, oil, clothing, etc.). Do not allow run-off from fire fighting to enter drains or water courses.

**Hazardous Combustion Products**
Highly toxic fumes Sodium oxides Chromium oxide

**Protective Equipment and Precautions for Firefighters**
As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear. Thermal decomposition can lead to release of irritating gases and vapors.
6. Accidental release measures

**Personal Precautions**
Use personal protective equipment. Evacuate personnel to safe areas. Ensure adequate ventilation. Keep people away from and upwind of spill/leak. Avoid dust formation.

**Environmental Precautions**
Do not flush into surface water or sanitary sewer system. Do not allow material to contaminate ground water system. Prevent product from entering drains. Local authorities should be advised if significant spillages cannot be contained. Should not be released into the environment. See Section 12 for additional ecological information. Avoid release to the environment. Collect spillage.

**Methods for Containment and Clean Up**
Sweep up or vacuum up spillage and collect in suitable container for disposal. Avoid dust formation. Soak up with inert absorbent material. Keep in suitable, closed containers for disposal. Sweep up and shovel into suitable containers for disposal.

7. Handling and storage

**Handling**
Use only under a chemical fume hood. Wear personal protective equipment. Do not get in eyes, on skin, or on clothing. Do not ingest. Do not breathe vapors/dust. Avoid dust formation. Keep away from clothing and other combustible materials.

**Storage**
Keep containers tightly closed in a dry, cool and well-ventilated place. Corrosives area. Do not store near combustible materials.

8. Exposure controls / personal protection

**Exposure Guidelines**

<table>
<thead>
<tr>
<th>Component</th>
<th>ACGIH TLV</th>
<th>OSHA PEL</th>
<th>NIOSH IDLH</th>
<th>Mexico OEL (TWA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sodium dichromate dihydrate</td>
<td>TWA: 0.05 mg/m³</td>
<td>(Vacated) Ceiling: 0.1 mg/m³</td>
<td>IDLH: 15 mg/m³ TWA: 0.0002 mg/m³</td>
<td>TWA: 0.05 mg/m³ TWA: 0.5 mg/m³</td>
</tr>
<tr>
<td>Sodium dichromate</td>
<td>TWA: 0.05 mg/m³</td>
<td>(Vacated) Ceiling: 0.1 mg/m³</td>
<td>IDLH: 15 mg/m³ TWA: 0.0002 mg/m³</td>
<td>TWA: 0.05 mg/m³ TWA: 0.5 mg/m³</td>
</tr>
</tbody>
</table>

**Legend**

ACGIH - American Conference of Governmental Industrial Hygienists  
OSHA - Occupational Safety and Health Administration  
NIOSH IDLH: The National Institute for Occupational Safety and Health Immediately Dangerous to Life or Health

**Engineering Measures**
Use only under a chemical fume hood. Ensure that eyewash stations and safety showers are close to the workstation location. Ensure adequate ventilation, especially in confined areas.

**Personal Protective Equipment**

- **Eye/face Protection**
  Tightly fitting safety goggles. Face-shield.

- **Skin and body protection**
  Long sleeved clothing.

- **Respiratory Protection**
  Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

- **Hygiene Measures**
  Handle in accordance with good industrial hygiene and safety practice.
9. Physical and chemical properties

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical State</td>
<td>Solid</td>
</tr>
<tr>
<td>Appearance</td>
<td>Orange</td>
</tr>
<tr>
<td>Odor</td>
<td>Odorless</td>
</tr>
<tr>
<td>Odor Threshold</td>
<td>No information available</td>
</tr>
<tr>
<td>pH</td>
<td>3.5-3.9 / 5% aq.sol</td>
</tr>
<tr>
<td>Melting Point/Range</td>
<td>357 °C / 674.6 °F</td>
</tr>
<tr>
<td>Boiling Point/Range</td>
<td>400 °C / 752 °F @ 760 mmHg</td>
</tr>
<tr>
<td>Flash Point</td>
<td>No information available</td>
</tr>
<tr>
<td>Evaporation Rate</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Flammability (solid,gas)</td>
<td>No information available</td>
</tr>
<tr>
<td>Flammability or explosive limits</td>
<td></td>
</tr>
<tr>
<td>Upper</td>
<td>No data available</td>
</tr>
<tr>
<td>Lower</td>
<td>No data available</td>
</tr>
<tr>
<td>Vapor Pressure</td>
<td>No information available</td>
</tr>
<tr>
<td>Vapor Density</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Specific Gravity</td>
<td>No information available</td>
</tr>
<tr>
<td>Solubility</td>
<td>No information available</td>
</tr>
<tr>
<td>Partition coefficient; n-octanol/water</td>
<td>No data available</td>
</tr>
<tr>
<td>Autoignition Temperature</td>
<td></td>
</tr>
<tr>
<td>Decomposition Temperature</td>
<td>400 °C</td>
</tr>
<tr>
<td>Viscosity</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Molecular Formula</td>
<td>Cr₂ Na₂ O₇ . 2 H₂ O</td>
</tr>
<tr>
<td>Molecular Weight</td>
<td>298</td>
</tr>
</tbody>
</table>

10. Stability and reactivity

Reactive Hazard       Yes
Stability             Stable under normal conditions. Oxidizer: Contact with combustible/organic material may cause fire.
Conditions to Avoid   Incompatible products. Excess heat. Combustible material.
Hazardous Decomposition Products Highly toxic fumes, Sodium oxides, Chromium oxide
Hazardous Polymerization Hazardous polymerization does not occur.
Hazardous Reactions   None under normal processing.

11. Toxicological information

Acute Toxicity

Product Information Component Information

<table>
<thead>
<tr>
<th>Component</th>
<th>LD50 Oral</th>
<th>LD50 Dermal</th>
<th>LC50 Inhalation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sodium dichromate</td>
<td>LD50 = 46 mg/kg ( Rat )</td>
<td>LD50 = 960 mg/kg ( Rabbit )</td>
<td>LC50 = 0.124 mg/L ( Rat ) 4 h</td>
</tr>
</tbody>
</table>

Toxicologically Synergistic Products
No information available

Delayed and immediate effects as well as chronic effects from short and long-term exposure

Irritation       Causes burns by all exposure routes
Sensitization   No information available
Sodium dichromate dihydrate

Carcinogenicity

The table below indicates whether each agency has listed any ingredient as a carcinogen.

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS-No</th>
<th>IARC</th>
<th>NTP</th>
<th>ACGIH</th>
<th>OSHA</th>
<th>Mexico</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sodium dichromate dihydrate</td>
<td>7789-12-0</td>
<td>Not listed</td>
<td>Known</td>
<td>A1</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Sodium dichromate dihydrate mykiss</td>
<td>10588-01-9</td>
<td>Group 1</td>
<td>Known</td>
<td>A1</td>
<td>X</td>
<td>A1</td>
</tr>
</tbody>
</table>

IARC: (International Agency for Research on Cancer)
- Group 1 - Carcinogenic to Humans
- Group 2A - Possibly Carcinogenic to Humans
- Group 2B - Possibly Carcinogenic to Humans

NTP: (National Toxicity Program)
- Known - Known Carcinogen
- Reasonably Anticipated - Reasonably Anticipated to be a Human Carcinogen

ACGIH: (American Conference of Governmental Industrial Hygienists)
- A1 - Known Human Carcinogen
- A2 - Suspected Human Carcinogen
- A3 - Animal Carcinogen

Mexico - Occupational Exposure Limits - Carcinogens
- A1 - Confirmed Human Carcinogen
- A2 - Suspected Human Carcinogen
- A3 - Confirmed Animal Carcinogen
- A4 - Not Classifiable as a Human Carcinogen
- A5 - Not Suspected as a Human Carcinogen

Mutagenic Effects
- Mutagenic

Reproductive Effects
- Possible risk of impaired fertility.

Developmental Effects
- No information available.

Teratogenicity
- Teratogenic effects have occurred in experimental animals.

Symptoms / effects, both acute and delayed
- Respiratory system
- Liver Kidney Blood

Endocrine Disruptor Information
- No information available

Other Adverse Effects
- See actual entry in RTECS for complete information.

12. Ecological Information

Ecotoxicity

Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment. The product contains following substances which are hazardous for the environment. May cause long-term adverse effects in the environment. Do not allow material to contaminate ground water system.

<table>
<thead>
<tr>
<th>Component</th>
<th>Freshwater Algae</th>
<th>Freshwater Fish</th>
<th>Microtox</th>
<th>Water Flea</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sodium dichromate</td>
<td>Not listed</td>
<td>LC50: = 213 mg/L, 96h static (Lepomis macrochirus) LC50: = 69 mg/L, 96h flow-through (Oncorhynchus mykiss) LC50: = 33.2 mg/L, 96h flow-through (Pimephales promelas)</td>
<td>Not listed</td>
<td>EC50: = 1.4 mg/L, 24h (Daphnia magna) EC50: 0.098 - 0.129 mg/L, 48h (Daphnia magna)</td>
</tr>
</tbody>
</table>
Persiste{n}ce and Degradability

Based on information available. May persist.

Bioaccumulation/Accumulation

No information available.

Mobility

Will likely be mobile in the environment due to its water solubility.

13. Disposal considerations

Waste Disposal Methods

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. Chemical waste generators must also consult local, regional, and national hazardous waste regulations to ensure complete and accurate classification.

14. Transport Information

DOT

<table>
<thead>
<tr>
<th>UN-No</th>
<th>Proper Shipping Name</th>
<th>Hazard Class</th>
<th>Subsidiary Hazard Class</th>
<th>Packing Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>UN3087</td>
<td>OXIDIZING SOLID, TOXIC, N.O.S.</td>
<td>5.1</td>
<td>6.1</td>
<td>II</td>
</tr>
</tbody>
</table>

TDG

<table>
<thead>
<tr>
<th>UN-No</th>
<th>Proper Shipping Name</th>
<th>Hazard Class</th>
<th>Subsidiary Hazard Class</th>
<th>Packing Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>UN3087</td>
<td>OXIDIZING SOLID, TOXIC, N.O.S.</td>
<td>5.1</td>
<td>6.1</td>
<td>II</td>
</tr>
</tbody>
</table>

IATA

<table>
<thead>
<tr>
<th>UN-No</th>
<th>Proper Shipping Name</th>
<th>Hazard Class</th>
<th>Subsidiary Hazard Class</th>
<th>Packing Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>UN3087</td>
<td>OXIDIZING SOLID, TOXIC, N.O.S.</td>
<td>5.1</td>
<td>6.1</td>
<td>II</td>
</tr>
</tbody>
</table>

IMDG/IMO

<table>
<thead>
<tr>
<th>UN-No</th>
<th>Proper Shipping Name</th>
<th>Hazard Class</th>
<th>Subsidiary Hazard Class</th>
<th>Packing Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>UN3087</td>
<td>OXIDIZING SOLID, TOXIC, N.O.S.</td>
<td>5.1</td>
<td>6.1</td>
<td>II</td>
</tr>
</tbody>
</table>

15. Regulatory information

All of the components in the product are on the following Inventory lists: X = listed

International Inventories

<table>
<thead>
<tr>
<th>Component</th>
<th>TSCA</th>
<th>DSL</th>
<th>NDSL</th>
<th>EINECS</th>
<th>ELINCS</th>
<th>NLP</th>
<th>PICCS</th>
<th>ENCS</th>
<th>AICS</th>
<th>IECSC</th>
<th>KECL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sodium dichromate dihydrate</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>-</td>
</tr>
<tr>
<td>Sodium dichromate</td>
<td>X</td>
<td>X</td>
<td>-</td>
<td>234-190-3</td>
<td>-</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>-</td>
</tr>
</tbody>
</table>

Legend:

X - Listed
E - Indicates a substance that is the subject of a Section 5(e) Consent order under TSCA.
F - Indicates a substance that is the subject of a Section 5(f) Rule under TSCA.
N - Indicates a polymeric substance containing no free-radical initiator in its inventory name but is considered to cover the designated polymer made with any free-radical initiator regardless of the amount used.
P - Indicates a commenced PMN substance
R - Indicates a substance that is the subject of a Section 6 risk management rule under TSCA.
S - Indicates a substance that is identified in a proposed or final Significant New Use Rule
T - Indicates a substance that is the subject of a Section 4 test rule under TSCA.
XU - Indicates a substance exempt from reporting under the Inventory Update Rule, i.e. Partial Updating of the TSCA Inventory Data Base Production and Site Reports (40 CFR 710(B).
Y1 - Indicates an exempt polymer that has a number-average molecular weight of 1,000 or greater.
Y2 - Indicates an exempt polymer that is a polyester and is made only from reactants included in a specified list of low concern reactants.
Sodium dichromate dihydrate

that comprises one of the eligibility criteria for the exemption rule.

U.S. Federal Regulations

TSCA 12(b)

<table>
<thead>
<tr>
<th>Component</th>
<th>TSCA 12(b)</th>
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<tbody>
<tr>
<td>Sodium dichromate dihydrate</td>
<td>Section 6</td>
</tr>
<tr>
<td>Sodium dichromate</td>
<td>Section 6</td>
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</table>

SARA 313

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS-No</th>
<th>Weight %</th>
<th>SARA 313 - Threshold Values %</th>
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<td>Sodium dichromate dihydrate</td>
<td>7789-12-0</td>
<td>&gt;95</td>
<td>0.1</td>
</tr>
<tr>
<td>Sodium dichromate</td>
<td>10588-01-9</td>
<td>-</td>
<td>0.1</td>
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SARA 311/312 Hazard Categories

<table>
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<tr>
<th>Acute Health Hazard</th>
<th>Yes</th>
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<tr>
<td>Chronic Health Hazard</td>
<td>Yes</td>
</tr>
<tr>
<td>Fire Hazard</td>
<td>No</td>
</tr>
<tr>
<td>Sudden Release of Pressure Hazard</td>
<td>No</td>
</tr>
<tr>
<td>Reactive Hazard</td>
<td>Yes</td>
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</tbody>
</table>

CWA (Clean Water Act)

<table>
<thead>
<tr>
<th>Component</th>
<th>CWA - Hazardous Substances</th>
<th>CWA - Reportable Quantities</th>
<th>CWA - Toxic Pollutants</th>
<th>CWA - Priority Pollutants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sodium dichromate dihydrate</td>
<td>-</td>
<td>-</td>
<td>X</td>
<td>-</td>
</tr>
<tr>
<td>Sodium dichromate</td>
<td>X</td>
<td>10 lb</td>
<td>X</td>
<td>-</td>
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Clean Air Act

<table>
<thead>
<tr>
<th>Component</th>
<th>HAPS Data</th>
<th>Class 1 Ozone Depletors</th>
<th>Class 2 Ozone Depletors</th>
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</thead>
<tbody>
<tr>
<td>Sodium dichromate dihydrate</td>
<td>X</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Sodium dichromate</td>
<td>X</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

OSHA Occupational Safety and Health Administration

<table>
<thead>
<tr>
<th>Component</th>
<th>Specifically Regulated Chemicals</th>
<th>Highly Hazardous Chemicals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sodium dichromate dihydrate</td>
<td>5 µg/m³ TWA 2.5 µg/m³ Action Level</td>
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</tr>
<tr>
<td>Sodium dichromate</td>
<td>5 µg/m³ TWA 2.5 µg/m³ Action Level</td>
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</tr>
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</table>

CERCLA

<table>
<thead>
<tr>
<th>Component</th>
<th>Hazardous Substances RQs</th>
<th>CERCLA EHS RQs</th>
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</thead>
<tbody>
<tr>
<td>Sodium dichromate</td>
<td>10 lb</td>
<td>-</td>
</tr>
</tbody>
</table>

California Proposition 65

This product contains the following proposition 65 chemicals

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS-No</th>
<th>California Prop. 65</th>
<th>Prop 65 NSRL</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sodium dichromate dihydrate</td>
<td>7789-12-0</td>
<td>Carcinogen Developmental Female Reproductive Male Reproductive</td>
<td>0.001 µg/day</td>
<td>Developmental Carcinogen</td>
</tr>
<tr>
<td>Sodium dichromate</td>
<td>10588-01-9</td>
<td>Carcinogen Developmental Female Reproductive Male Reproductive</td>
<td>0.001 µg/day</td>
<td>Developmental Carcinogen</td>
</tr>
</tbody>
</table>

U.S. State Right-to-Know Regulations

<table>
<thead>
<tr>
<th>Component</th>
<th>Massachusetts</th>
<th>New Jersey</th>
<th>Pennsylvania</th>
<th>Illinois</th>
<th>Rhode Island</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sodium dichromate</td>
<td>-</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>
Sodium dichromate dihydrate

<table>
<thead>
<tr>
<th>dihydrate</th>
<th>X</th>
<th>X</th>
<th>X</th>
<th>X</th>
<th>X</th>
<th>X</th>
</tr>
</thead>
</table>

| Sodium dichromate | X | X | X | X | X | X |

U.S. Department of Transportation

Reportable Quantity (RQ): N
DOT Marine Pollutant: N
DOT Severe Marine Pollutant: N

U.S. Department of Homeland Security
This product does not contain any DHS chemicals.

Other International Regulations

Mexico - Grade: No information available

16. Other information

Prepared By: Regulatory Affairs
Thermo Fisher Scientific
Email: EMSDS.RA@thermofisher.com

Creation Date: 16-Nov-2010
Revision Date: 24-May-2017
Print Date: 24-May-2017
Revision Summary: This document has been updated to comply with the US OSHA HazCom 2012 Standard replacing the current legislation under 29 CFR 1910.1200 to align with the Globally Harmonized System of Classification and Labeling of Chemicals (GHS).

Disclaimer
The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

End of SDS
SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers
   Product name: Boric acid

   Product Number: B6768
   Brand: Sigma
   Index-No.: 005-007-00-2
   REACH No.: 01-2119486683-25-XXXX
   CAS-No.: 10043-35-3

1.2 Relevant identified uses of the substance or mixture and uses advised against
   Identified uses: Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet
   Company: Sigma-Aldrich Chemie GmbH
   Riedstrasse 2
   D-89555 STEINHEIM
   Telephone: +49 89-6513-1444
   Fax: +49 7329-97-2319
   E-mail address: eurtechserv@sial.com

1.4 Emergency telephone number
   Emergency Phone #
   0800 181 7059 (CHEMTREC Deutschland)
   +49 (0)696 43508409 (CHEMTREC weltweit)

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

   Classification according to Regulation (EC) No 1272/2008
   Reproductive toxicity (Category 1B), H360FD

   For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 Label elements

   Labelling according Regulation (EC) No 1272/2008
   Pictogram

   Signal word: Danger

   Hazard statement(s)
   H360FD: May damage fertility. May damage the unborn child.

   Precautionary statement(s)
   P201: Obtain special instructions before use.
   P280: Wear protective gloves/ protective clothing/ eye protection/ face protection.
   P308 + P313: IF exposed or concerned: Get medical advice/ attention.
Supplemental Hazard Statements
Restricted to professional users.

2.3 Other hazards
This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

SECTION 3: Composition/information on ingredients

3.1 Substances
Formula : \( \text{H}_3\text{BO}_3 \)
Molecular weight : 61.83 g/mol
CAS-No. : 10043-35-3
EC-No. : 233-139-2
Index-No. : 005-007-00-2
Registration number : 01-2119486683-25-XXXX

Hazardous ingredients according to Regulation (EC) No 1272/2008

<table>
<thead>
<tr>
<th>Component</th>
<th>Classification</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Boric acid</strong></td>
<td>Included in the Candidate List of Substances of Very High Concern (SVHC) according to Regulation (EC) No. 1907/2006 (REACH)</td>
<td>&lt;= 100 %</td>
</tr>
<tr>
<td>CAS-No.</td>
<td>10043-35-3</td>
<td>Repr. 1B; H360FD</td>
</tr>
<tr>
<td>EC-No.</td>
<td>233-139-2</td>
<td>Concentration limits:</td>
</tr>
<tr>
<td>Index-No.</td>
<td>005-007-00-2</td>
<td>&gt;= 5.5 %: Repr. 1B, H360FD;</td>
</tr>
<tr>
<td>Registration number</td>
<td>01-2119486683-25-XXXX</td>
<td></td>
</tr>
</tbody>
</table>

For the full text of the H-Statements mentioned in this Section, see Section 16.

SECTION 4: First aid measures

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.
5.2 Special hazards arising from the substance or mixture
No data available

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
No data available

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
Use personal protective equipment. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust. For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

6.3 Methods and materials for containment and cleaning up
Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling
Avoid formation of dust and aerosols. Avoid exposure - obtain special instructions before use. Provide appropriate exhaust ventilation at places where dust is formed. For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Store in cool place. Keep container tightly closed in a dry and well-ventilated place. Moisture sensitive.

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

SECTION 8: Exposure controls/personal protection

8.1 Control parameters
Components with workplace control parameters

8.2 Exposure controls
Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection
Safety glasses with side-shields conforming to EN166 Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove’s outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

The selected protective gloves have to satisfy the specifications of EU Directive 89/686/EEC and the standard EN 374 derived from it.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0,11 mm
Break through time: 480 min
Material tested: Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0,11 mm
Break through time: 480 min
Material tested: Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de,
estest method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374,
contact the supplier of the CE approved gloves. This recommendation is advisory only and must
be evaluated by an industrial hygienist and safety officer familiar with the specific situation of
anticipated use by our customers. It should not be construed as offering an approval for any
specific use scenario.

Body Protection
Impervious clothing, The type of protective equipment must be selected according to the
concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face particle
respirator type N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineering
controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use
respirators and components tested and approved under appropriate government standards such as
NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a) Appearance Form: solid
b) Odour No data available
c) Odour Threshold No data available
d) pH 5,1 at 1,8 g/l at 25 °C
e) Melting point/freezing point Melting point/range: 160 °C - dec.
f) Initial boiling point and boiling range 300 °C
g) Flash point No data available
h) Evaporation rate No data available
i) Flammability (solid, gas) No data available
j) Upper/lower flammability or explosive limits No data available
k) Vapour pressure 3,5 hPa at 20 °C
l) Vapour density No data available
m) Relative density 1,440 g/cm3
n) Water solubility soluble
o) Partition coefficient: n- No data available
SECTION 10: Stability and reactivity

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
Exposure to moisture

10.5 Incompatible materials
Potassium, Acid anhydrides

10.6 Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Borane/boron oxides
Other decomposition products - No data available
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - 2.660 mg/kg

Skin corrosion/irritation
No data available

Serious eye damage/eye irritation
No data available

Respiratory or skin sensitisation
No data available

Germ cell mutagenicity
No data available

Carcinogenicity
IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

Reproductive toxicity
fetotoxicity
Presumed human reproductive toxicant
Presumed human reproductive toxicant
Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

Additional Information
RTECS: ED4550000

Toxicity reported for borates in humans: ingestion or absorption may cause nausea, vomiting, diarrhea, abdominal cramps, and erythematous lesions on the skin and mucous membranes. Other symptoms include: circulatory collapse, tachycardia, cyanosis, delirium, convulsions, and coma. Death has been reported to occur in infants from less than 5 grams and in adults from 5 to 20 grams.

Liver - Irregularities - Based on Human Evidence

SECTION 12: Ecological information

12.1 Toxicity
Toxicity to fish
LC50 - Ptychocheilus lucius - 279 mg/l - 96 h
LC0 - Lepomis macrochirus (Bluegill) - > 1.021 mg/l - 96 h
Toxicity to daphnia and other aquatic invertebrates
LC50 - Daphnia magna (Water flea) - 53.2 mg/l - 21 d
EC50 - Daphnia magna (Water flea) - 133 mg/l - 48 h

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

12.6 Other adverse effects
No data available

SECTION 13: Disposal considerations

13.1 Waste treatment methods
Product
Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber. Offer surplus and non-recyclable solutions to a licensed disposal company.

Contaminated packaging
Dispose of as unused product.

SECTION 14: Transport information

14.1 UN number
ADR/RID: - IMDG: - IATA: -

14.2 UN proper shipping name
ADR/RID: Not dangerous goods IMDG: Not dangerous goods IATA: Not dangerous goods
<table>
<thead>
<tr>
<th>Section</th>
<th>Description</th>
<th>ADR/RID</th>
<th>IMDG</th>
<th>IATA</th>
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</thead>
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<tr>
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<td>-</td>
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</tr>
<tr>
<td></td>
<td></td>
<td>IMDG: -</td>
<td>IATA: -</td>
<td></td>
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<td>14.4</td>
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<td></td>
<td></td>
<td>IMDG: -</td>
<td>IATA: -</td>
<td></td>
</tr>
<tr>
<td>14.5</td>
<td>Environmental hazards</td>
<td>-</td>
<td>IMDG Marine pollutant: no</td>
<td>IATA: no</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No data available</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14.6</td>
<td>Special precautions for user</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

SECTION 15: Regulatory information

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture
This safety datasheet complies with the requirements of Regulation (EC) No. 1907/2006.

**Authorisations and/or restrictions on use**
- REACH - Restrictions on the manufacture, placing on the market and use of certain dangerous substances, preparations and articles (Annex XVII) : Boric acid
- REACH - Candidate List of Substances of Very High Concern for Authorisation (Article 59).

15.2 Chemical safety assessment
For this product a chemical safety assessment was not carried out

SECTION 16: Other information

**Full text of H-Statements referred to under sections 2 and 3.**
H360FD May damage fertility. May damage the unborn child.

**Further information**
Copyright 2016 Sigma-Aldrich Co. LLC. License granted to make unlimited paper copies for internal use only.
The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.
SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers

Product name: Ethylene glycol butyl ether

Product Number: 537551
Brand: Sigma-Aldrich
Index-No.: 603-014-00-0
REACH No.: A registration number is not available for this substance as the substance or its uses are exempted from registration, the annual tonnage does not require a registration or the registration is envisaged for a later registration deadline.
CAS-No.: 111-76-2

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses: Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet

Company: Sigma-Aldrich Chemie GmbH
Riedstrasse 2
D-89555 STEINHEIM

Telephone: +49 89-6513-1444
Fax: +49 7329-97-2319
E-mail address: eurtechserv@sial.com

1.4 Emergency telephone number

Emergency Phone # 0800 181 7059 (CHEMTREC Deutschland)
+49 (0)696 43508409 (CHEMTREC weltweit)

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

Classification according to Regulation (EC) No 1272/2008
Acute toxicity, Oral (Category 4), H302
Acute toxicity, Inhalation (Category 4), H332
Acute toxicity, Dermal (Category 4), H312
Skin irritation (Category 2), H315
Eye irritation (Category 2), H319

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 Label elements

Labelling according Regulation (EC) No 1272/2008
Pictogram

Signal word Warning
Hazard statement(s)
H302 + H312 + H332  Harmful if swallowed, in contact with skin or if inhaled
H315  Causes skin irritation.
H319  Causes serious eye irritation.

Precautionary statement(s)
P261  Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray.
P301 + P312 + P330  IF SWALLOWED: Call a POISON CENTER or doctor/ physician if you feel unwell. Rinse mouth.
P302 + P352 + P312  IF ON SKIN: Wash with plenty of water. Call a POISON CENTER or doctor/ physician if you feel unwell.
P304 + P340 + P312  IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER or doctor/ physician if you feel unwell.
P305 + P351 + P338  IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P337 + P313  If eye irritation persists: Get medical advice/ attention.

Supplemental Hazard Statements  none

2.3 Other hazards
This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher. Rapidly absorbed through skin.

SECTION 3: Composition/information on ingredients

3.1 Substances
Synonyms  :  2-Butoxyethanol
            Butyl glycol
            EB Solvent

Formula  :  C₆H₁₄O₂
Molecular weight :  118.17 g/mol
CAS-No. :  111-76-2
EC-No. :  203-905-0
Index-No. :  603-014-00-0

Hazardous ingredients according to Regulation (EC) No 1272/2008

<table>
<thead>
<tr>
<th>Component</th>
<th>Classification</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-Butoxyethanol</td>
<td></td>
<td>&lt;= 100 %</td>
</tr>
<tr>
<td>CAS-No.</td>
<td>111-76-2</td>
<td></td>
</tr>
<tr>
<td>EC-No.</td>
<td>203-905-0</td>
<td></td>
</tr>
<tr>
<td>Index-No.</td>
<td>603-014-00-0</td>
<td></td>
</tr>
</tbody>
</table>

For the full text of the H-Statements mentioned in this Section, see Section 16.

SECTION 4: First aid measures

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.
In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If swallowed
Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

SECTION 5: Firefighting measures

5.1 Extinguishing media
Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
Carbon oxides

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
Use water spray to cool unopened containers.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
Use personal protective equipment. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Beware of vapours accumulating to form explosive concentrations. Vapours can accumulate in low areas.
For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

6.3 Methods and materials for containment and cleaning up
Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations (see section 13). Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid inhalation of vapour or mist. Keep away from sources of ignition - No smoking. Take measures to prevent the build up of electrostatic charge.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Store in cool place. Keep container tightly closed in a dry and well-ventilated place. Storage class (TRGS 510): Combustible liquids

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated
SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Components with workplace control parameters

8.2 Exposure controls

Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove’s outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

The selected protective gloves have to satisfy the specifications of EU Directive 89/686/EEC and the standard EN 374 derived from it.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0,4 mm
Break through time: 480 min
Material tested: Camatri® (KCL 730 / Aldrich Z677442, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0,2 mm
Break through time: 30 min
Material tested: Dermatril® P (KCL 743 / Aldrich Z677388, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de,
test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a) Appearance Form: liquid
9.2 Other safety information

Surface tension 65,03 mN/m at 20 °C
Relative vapour density 4,08 - (Air = 1.0)

SECTION 10: Stability and reactivity

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
Heat, flames and sparks.

10.5 Incompatible materials
Strong oxidizing agents

10.6 Hazardous decomposition products
Other decomposition products - No data available
In the event of fire: see section 5
SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - male - 880 mg/kg
(OECD Test Guideline 401)
LD50 Dermal - Rabbit - male - 1.060 mg/kg
(OECD Test Guideline 402)
LD50 Intraperitoneal - Rat - 220 mg/kg
LD50 Intravenous - Rat - 307 mg/kg

Skin corrosion/irritation
Skin - Rabbit
Result: Skin irritation - 20 h

Serious eye damage/eye irritation
Eyes - Rabbit
Result: Eye irritation - 24 h
(OECD Test Guideline 405)

Respiratory or skin sensitisation
Maximisation Test (GPMT) - Guinea pig
Result: Does not cause skin sensitisation.
(OECD Test Guideline 406)

Germ cell mutagenicity
Hamster ovary
Result: negative

OECD Test Guideline 474
Mouse - male
Result: negative

Carcinogenicity
IARC: 3 - Group 3: Not classifiable as to its carcinogenicity to humans (2-Butoxyethanol)

Reproductive toxicity
Overexposure may cause reproductive disorder(s) based on tests with laboratory animals.

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

Additional Information
Repeated dose Rat - male - Oral - NOAEL : < 69 mg/kg - OECD Test Guideline 408

RTECS: KJ8575000

Human exposure above 200 ppm can be expected to cause narcosis, damage to the kidney and liver and present an abnormal blood picture showing erythropenia, reticulocytosis, granulocytosis, leukocytosis, and would be likely to cause fragility of erythrocytes and hematuria. Swallowing of 2-butoxyethanol results in a sour taste that turns to a burning sensation and is followed by numbness of the tongue which indicates paralysis of the sensory nerve endings., Central nervous system depression, Headache, narcosis
SECTION 12: Ecological information

12.1 Toxicity

Toxicity to fish
static test LC50 - Oncorhynchus mykiss (rainbow trout) - 1.474 mg/l - 96 h
(OECD Test Guideline 203)

Toxicity to daphnia and other aquatic invertebrates
Immobilization EC50 - Daphnia magna (Water flea) - 1.550 mg/l - 48 h
(OECD Test Guideline 202)

Toxicity to algae
Growth inhibition EC50 - Pseudokirchneriella subcapitata (green algae) - 1.840 mg/l - 72 h
(OECD Test Guideline 201)

12.2 Persistence and degradability

Biodegradability
aerobic - Exposure time 28 d
Result: 90,4 % - Readily biodegradable
(OECD Test Guideline 301B)
Remarks: The 10 day time window criterion is not fulfilled.

Ratio BOD/ThBOD 88 %

12.3 Bioaccumulative potential

No data available

12.4 Mobility in soil

No data available

12.5 Results of PBT and vPvB assessment

This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

12.6 Other adverse effects

No data available

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product
This combustible material may be burned in a chemical incinerator equipped with an afterburner and scrubber. Offer surplus and non-recyclable solutions to a licensed disposal company.

Contaminated packaging
Dispose of as unused product.

SECTION 14: Transport information

14.1 UN number
ADR/RID: - IMDG: - IATA: -

14.2 UN proper shipping name
ADR/RID: Not dangerous goods IMDG: Not dangerous goods IATA: Not dangerous goods

14.3 Transport hazard class(es)
ADR/RID: - IMDG: - IATA: -

14.4 Packaging group
ADR/RID: - IMDG: - IATA: -

14.5 Environmental hazards
ADR/RID: no IMDG Marine pollutant: no IATA: no
14.6 Special precautions for user
No data available

SECTION 15: Regulatory information
This safety datasheet complies with the requirements of Regulation (EC) No. 453/2010.

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture

15.2 Chemical Safety Assessment
For this product a chemical safety assessment was not carried out

SECTION 16: Other information
Full text of H-Statements referred to under sections 2 and 3.
H302 Harmful if swallowed.
H302 + H312 + Harmful if swallowed, in contact with skin or if inhaled
H332
H312 Harmful in contact with skin.
H315 Causes skin irritation.
H319 Causes serious eye irritation.
H332 Harmful if inhaled.

Further information
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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.
SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers
Product name: Sodium tetraborate decahydrate

Product Number: S9640
Brand: Sigma-Aldrich
Index-No.: 005-011-01-1
REACH No.: 01-2119490790-32-XXXX
CAS-No.: 1303-96-4

1.2 Relevant identified uses of the substance or mixture and uses advised against
Identified uses: Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet
Company: Sigma-Aldrich Chemie GmbH
Riedstrasse 2
D-89555 STEINHEIM

Telephone: +49 89-6513-1444
Fax: +49 7329-97-2319
E-mail address: eurtechserv@sial.com

1.4 Emergency telephone number
Emergency Phone #
0800 181 7059 (CHEMTREC Deutschland)
+49 (0)696 43508409 (CHEMTREC weltweit)

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture
Classification according to Regulation (EC) No 1272/2008
Reproductive toxicity (Category 1B), H360FD

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 Label elements
Labelling according Regulation (EC) No 1272/2008
Pictogram

Signal word: Danger

Hazard statement(s)
H360FD: May damage fertility. May damage the unborn child.

Precautionary statement(s)
P201: Obtain special instructions before use.
P280: Wear protective gloves/ protective clothing/ eye protection/ face protection.
SECTION 3: Composition/information on ingredients

3.1 Substances
Synonyms: Boraxdecahydrate Sodium boratedecahydrate
Formula: B₄Na₂O₇ · 10H₂O
Molecular weight: 381,37 g/mol
CAS-No.: 1303-96-4
EC-No.: 215-540-4
Index-No.: 005-011-01-1
Registration number: 01-2119490790-32-XXXX

Hazardous ingredients according to Regulation (EC) No 1272/2008

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<td>Included in the Candidate List of Substances of Very High Concern (SVHC) according to Regulation (EC) No. 1907/2006 (REACH)</td>
<td></td>
</tr>
<tr>
<td>CAS-No.</td>
<td>1303-96-4</td>
<td>Repr. 1B; H360FD</td>
</tr>
<tr>
<td>EC-No.</td>
<td>215-540-4</td>
<td>Concentration limits:</td>
</tr>
<tr>
<td>Index-No.</td>
<td>005-011-01-1</td>
<td>&gt;= 8,5 %: Repr. 1B, H360FD;</td>
</tr>
<tr>
<td>Registration number</td>
<td>01-2119490790-32-XXXX</td>
<td>&lt;= 100 %</td>
</tr>
</tbody>
</table>

For the full text of the H-Statements mentioned in this Section, see Section 16.

SECTION 4: First aid measures

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available
SECTION 5: Firefighting measures

5.1 Extinguishing media

**Suitable extinguishing media**
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
No data available

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
No data available

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
Use personal protective equipment. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust. For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

6.3 Methods and materials for containment and cleaning up
Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid formation of dust and aerosols. Provide appropriate exhaust ventilation at places where dust is formed. For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Store in cool place. Keep container tightly closed in a dry and well-ventilated place.

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Components with workplace control parameters

8.2 Exposure controls

Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

**Eye/face protection**
Safety glasses with side-shields conforming to EN166 Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

**Skin protection**
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of
contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

The selected protective gloves have to satisfy the specifications of EU Directive 89/686/EEC and the standard EN 374 derived from it.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0,11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0,11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Impervious clothing, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a) Appearance  Form: crystalline
    Colour: white

b) Odour  odourless

c) Odour Threshold  No data available

d) pH  9.2 at 10 g/l

e) Melting point/freezing point  62 °C

f) Initial boiling point and boiling range  Decomposes below the boiling point.

g) Flash point  No data available

h) Evaporation rate  No data available

i) Flammability (solid, gas)  The product is not flammable.

j) Upper/lower flammability or explosive limits  No data available
SECTION 10: Stability and reactivity

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
No data available

10.5 Incompatible materials
Strong oxidizing agents, Strong reducing agents

10.6 Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Borane/boron oxides, Sodium oxides
Other decomposition products - No data available
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - 4.500 - 5.000 mg/kg
LC50 Inhalation - Rat - 4 h - > 2,04 mg/l
(OECD Test Guideline 403)
LD50 Dermal - Rabbit - 10.000 mg/kg

Skin corrosion/irritation
Skin - Rabbit
Result: No skin irritation

Serious eye damage/eye irritation
Eyes - Rabbit
Result: Mild eye irritation

Respiratory or skin sensitisation
No data available

k) Vapour pressure No data available
l) Vapour density No data available
m) Relative density 1,73 g/cm³ at 25 ºC
n) Water solubility 38,1 g/l at 20 ºC - completely soluble
o) Partition coefficient: n-octanol/water log Pow: -1,53
p) Auto-ignition temperature No data available
q) Decomposition temperature No data available
r) Viscosity No data available
s) Explosive properties No data available
t) Oxidizing properties No data available

9.2 Other safety information
No data available
**Germ cell mutagenicity**
No data available

**Carcinogenicity**
IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

**Reproductive toxicity**
Presumed human reproductive toxicant

**Specific target organ toxicity - single exposure**
No data available

**Specific target organ toxicity - repeated exposure**
No data available

**Aspiration hazard**
No data available

**Additional Information**
RTECS: VZ2275000
Animal feeding studies in rat, mouse and dog, at high doses, have demonstrated effects on fertility and testes. Studies with the chemically related boric acid in the rat, mouse and rabbit, at high doses, demonstrate developmental effects on the fetus, including fetal weight loss and minor skeletal variations. The doses administered were many times in excess of those to which humans would normally be exposed. Human epidemiological studies show no increase in pulmonary disease in occupational populations with chronic exposures to boric acid dust and sodium borate dust. A recent epidemiological study under the conditions of normal occupational exposure to borate dusts indicated no effect on fertility.

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### SECTION 12: Ecological information

**12.1 Toxicity**
- Toxicity to fish  
  LC50 - Carassius auratus (goldfish) - 178 mg/l - 72 h
- Toxicity to daphnia and other aquatic invertebrates  
  EC50 - Daphnia magna (Water flea) - 1.085 - 1.402 mg/l - 48 h
- Toxicity to algae  
  IC50 - Desmodesmus subspicatus (green algae) - 158 mg/l - 96 h

**12.2 Persistence and degradability**
The methods for determining biodegradability are not applicable to inorganic substances.

**12.3 Bioaccumulative potential**
No bioaccumulation is to be expected (log Pow <= 4).

**12.4 Mobility in soil**
No data available

**12.5 Results of PBT and vPvB assessment**
This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

**12.6 Other adverse effects**
No data available

---

### SECTION 13: Disposal considerations

**13.1 Waste treatment methods**

**Product**
Offer surplus and non-recyclable solutions to a licensed disposal company. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.
Contaminated packaging
Dispose of as unused product.

SECTION 14: Transport information

14.1 UN number
ADR/RID: - IMDG: - IATA: -

14.2 UN proper shipping name
ADR/RID: Not dangerous goods
IMDG: Not dangerous goods
IATA: Not dangerous goods

14.3 Transport hazard class(es)
ADR/RID: - IMDG: - IATA: -

14.4 Packaging group
ADR/RID: - IMDG: - IATA: -

14.5 Environmental hazards
ADR/RID: no IMDG Marine pollutant: no IATA: no

14.6 Special precautions for user
No data available

SECTION 15: Regulatory information

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture
This safety datasheet complies with the requirements of Regulation (EC) No. 1907/2006.

Authorisations and/or restrictions on use
REACH - Restrictions on the manufacture, placing on the market and use of certain dangerous substances, preparations and articles (Annex XVII)
REACH - Candidate List of Substances of Very High Concern for Authorisation (Article 59).

15.2 Chemical safety assessment
For this product a chemical safety assessment was not carried out

SECTION 16: Other information

Full text of H-Statements referred to under sections 2 and 3.
H360FD May damage fertility. May damage the unborn child.

Further information
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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.
SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers

Product name: Hexamethylenediamine

Product Number: H11696
Brand: Aldrich
Index-No.: 612-104-00-9
REACH No.: A registration number is not available for this substance as the substance or its uses are exempted from registration, the annual tonnage does not require a registration or the registration is envisaged for a later registration deadline.

CAS-No.: 124-09-4

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses: Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet

Company: Sigma-Aldrich Chemie GmbH
Riedstrasse 2
D-89555 STEINHEIM

Telephone: +49 89-6513-1444
Fax: +49 7329-97-2319
E-mail address: eurtechserv@sial.com

1.4 Emergency telephone number

Emergency Phone #: 0800 181 7059 (CHEMTREC Deutschland)
+49 (0)696 43508409 (CHEMTREC weltweit)

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

Classification according to Regulation (EC) No 1272/2008
Acute toxicity, Oral (Category 4), H302
Acute toxicity, Dermal (Category 4), H312
Skin corrosion (Category 1B), H314
Specific target organ toxicity - single exposure (Category 3), Respiratory system, H335

For the full text of the H-Statements mentioned in this Section, see Section 16.

Classification according to EU Directives 67/548/EEC or 1999/45/EC
C Corrosive R34
Xn Harmful R21/22
Xi Irritant R37

For the full text of the R-phrases mentioned in this Section, see Section 16.

2.2 Label elements

Labelling according Regulation (EC) No 1272/2008
Pictogram
SECTION 3: Composition/information on ingredients

3.1 Substances
Synonyms : 1,6-Diaminohexane
            1,6-Hexanediamine

Formula : C₆H₁₆N₂
Molecular weight : 116.20 g/mol
CAS-No. : 124-09-4
EC-No. : 204-679-6
Index-No. : 612-104-00-9

Hazardous ingredients according to Regulation (EC) No 1272/2008

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<th>Classification</th>
<th>Concentration</th>
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<td>CAS-No.</td>
<td>124-09-4</td>
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<tr>
<td>Index-No.</td>
<td>612-104-00-9</td>
<td>Acute Tox. 4; Skin Corr. 1B; STOT SE 3; H302 + H312, H314, H335</td>
</tr>
<tr>
<td></td>
<td></td>
<td>&lt;= 100 %</td>
</tr>
</tbody>
</table>

Hazardous ingredients according to Directive 1999/45/EC

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<thead>
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<th>Component</th>
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<tr>
<td>Hexamethylenediamine</td>
<td>C, R21/22 - R34 - R37</td>
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</table>

For the full text of the H-Statements and R-Phrases mentioned in this Section, see Section 16

SECTION 4: First aid measures

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.
In case of skin contact
Take off contaminated clothing and shoes immediately. Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If swallowed
Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
Carbon oxides, Nitrogen oxides (NOx)

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
No data available

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
Use personal protective equipment. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust. For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up
Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid formation of dust and aerosols. Provide appropriate exhaust ventilation at places where dust is formed. For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Store in cool place. Keep container tightly closed in a dry and well-ventilated place.
Hygroscopic. Store under inert gas.
Storage class (TRGS 510): Non-combustible, corrosive hazardous materials

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated
SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Components with workplace control parameters

8.2 Exposure controls

Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove’s outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

The selected protective gloves have to satisfy the specifications of EU Directive 89/686/EEC and the standard EN 374 derived from it.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0,4 mm
Break through time: 480 min
Material tested: Camatril® (KCL 730 / Aldrich Z677442, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0,11 mm
Break through time: 60 min
Material tested: Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374

If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.
SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a) Appearance
   Form: solid
   Colour: colourless

b) Odour
   No data available

c) Odour Threshold
   No data available

d) pH
   12,4 at 100 g/l at 25 °C

e) Melting point/freezing point
   Melting point/range: 42 - 45 °C - lit.

f) Initial boiling point and boiling range
   204 - 205 °C

g) Flash point
   80 °C - closed cup

h) Evaporation rate
   No data available

i) Flammability (solid, gas)
   No data available

j) Upper/lower flammability or explosive limits
   Upper explosion limit: 6,3 % (V)
   Lower explosion limit: 0,7 % (V)

k) Vapour pressure
   No data available

l) Vapour density
   4,01 - (Air = 1.0)

m) Relative density
   0,89 g/cm3 at 25 °C

n) Water solubility
   No data available

o) Partition coefficient: n-octanol/water
   log Pow: 0,02

p) Auto-ignition temperature
   No data available

q) Decomposition temperature
   No data available

r) Viscosity
   No data available

s) Explosive properties
   No data available

t) Oxidizing properties
   No data available

9.2 Other safety information

Relative vapour density 4,01 - (Air = 1.0)

SECTION 10: Stability and reactivity

10.1 Reactivity

No data available

10.2 Chemical stability

hygroscopic

Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions

No data available

10.4 Conditions to avoid

No data available

10.5 Incompatible materials

acids, Acid chlorides, Acid anhydrides, Strong oxidizing agents, Carbon dioxide (CO2)
10.6 **Hazardous decomposition products**
Other decomposition products - No data available
In the event of fire: see section 5

**SECTION 11: Toxicological information**

11.1 **Information on toxicological effects**

**Acute toxicity**
LD50 Oral - Rat - 750 mg/kg
LD50 Dermal - Rabbit - 1.110 mg/kg

**Skin corrosion/irritation**
No data available

**Serious eye damage/eye irritation**
No data available

**Respiratory or skin sensitisation**
No data available

**Germ cell mutagenicity**
No data available

**Carcinogenicity**

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

**Reproductive toxicity**
No data available

**Specific target organ toxicity - single exposure**
May cause respiratory irritation.

**Specific target organ toxicity - repeated exposure**
No data available

**Aspiration hazard**
No data available

**Additional Information**
RTECS: MO1180000
burning sensation, Cough, wheezing, laryngitis, Shortness of breath, spasm, inflammation and edema of the larynx, spasm, inflammation and edema of the bronchi, pneumonitis, pulmonary edema, Material is extremely destructive to tissue of the mucous membranes and upper respiratory tract, eyes, and skin.
Liver - Irregularities - Based on Human Evidence

**SECTION 12: Ecological information**

12.1 **Toxicity**

Toxicity to fish
LC50 - Leuciscus idus (Golden orfe) - 62 mg/l - 96 h
Toxicity to daphnia and other aquatic invertebrates
EC50 - Daphnia magna (Water flea) - 23.4 mg/l - 48 h

12.2 **Persistence and degradability**
No data available

12.3 **Bioaccumulative potential**
No data available

12.4 **Mobility in soil**
No data available

12.5 **Results of PBT and vPvB assessment**
This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

12.6 Other adverse effects
Harmful to aquatic life.

SECTION 13: Disposal considerations

13.1 Waste treatment methods
Product
Offer surplus and non-recyclable solutions to a licensed disposal company. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Contaminated packaging
Dispose of as unused product.

SECTION 14: Transport information

14.1 UN number
ADR/RID: 2280  IMDG: 2280  IATA: 2280

14.2 UN proper shipping name
ADR/RID: HEXAMETHYLENEDIAMINE, SOLID
IMDG: HEXAMETHYLENEDIAMINE, SOLID
IATA: Hexamethylenediamine, solid

14.3 Transport hazard class(es)
ADR/RID: 8  IMDG: 8  IATA: 8

14.4 Packaging group
ADR/RID: III  IMDG: III  IATA: III

14.5 Environmental hazards
ADR/RID: no  IMDG Marine pollutant: no  IATA: no

14.6 Special precautions for user
No data available

SECTION 15: Regulatory information

This safety datasheet complies with the requirements of Regulation (EC) No. 1907/2006.

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture
No data available

15.2 Chemical Safety Assessment
For this product a chemical safety assessment was not carried out

SECTION 16: Other information

Full text of H-statements referred to under sections 2 and 3.

Acute Tox.  Acute toxicity
H302  Harmful if swallowed.
H302 + H312  Harmful if swallowed or in contact with skin
H312  Harmful in contact with skin.
H314  Causes severe skin burns and eye damage.
H335  May cause respiratory irritation.
Skin Corr.  Skin corrosion

Full text of R-phrases referred to under sections 2 and 3

C  Corrosive
R21/22 Harmful in contact with skin and if swallowed.
R34 Causes burns.
R37 Irritating to respiratory system.

**Further information**
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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.
SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers

Product name: Hydroquinone

Product Number: H9003
Brand: Sigma-Aldrich
Index-No.: 604-005-00-4
REACH No.: A registration number is not available for this substance as the substance or its uses are exempted from registration, the annual tonnage does not require a registration or the registration is envisaged for a later registration deadline.
CAS-No.: 123-31-9

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses: Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet

Company: Sigma-Aldrich Chemie GmbH
Riedstrasse 2
D-89555 STEINHEIM

Telephone: +49 89-6513-1444
Fax: +49 7329-97-2319
E-mail address: eurtechserv@sial.com

1.4 Emergency telephone number

Emergency Phone #: 0800 181 7059 (CHEMTREC Deutschland)
+49 (0)696 43508409 (CHEMTREC weltweit)

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

Classification according to Regulation (EC) No 1272/2008
Acute toxicity, Oral (Category 4), H302
Serious eye damage (Category 1), H318
Skin sensitisation (Category 1), H317
Germ cell mutagenicity (Category 2), H341
Carcinogenicity (Category 2), H351
Acute aquatic toxicity (Category 1), H400
Chronic aquatic toxicity (Category 1), H410

For the full text of the H-Statements mentioned in this Section, see Section 16.

Classification according to EU Directives 67/548/EEC or 1999/45/EC
R40
R68
Xn Harmful R22
Xi Irritant R41
R43
N Dangerous for the environment R50
2.2 Label elements

Labelling according Regulation (EC) No 1272/2008

Pictogram

Signal word
Danger

Hazard statement(s)
H302 Harmful if swallowed.
H317 May cause an allergic skin reaction.
H318 Causes serious eye damage.
H341 Suspected of causing genetic defects.
H351 Suspected of causing cancer.
H410 Very toxic to aquatic life with long lasting effects.

Precautionary statement(s)
P273 Avoid release to the environment.
P280 Wear protective gloves/ eye protection/ face protection.
P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P501 Dispose of contents/ container to an approved waste disposal plant.

Supplemental Hazard Statements

2.3 Other hazards

This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

SECTION 3: Composition/information on ingredients

3.1 Substances

Synonyms: 1,4-Benzenediol
           1,4-Dihydroxybenzene

Formula: \( \text{C}_6\text{H}_6\text{O}_2 \)
Molecular weight: 110.11 g/mol
CAS-No.: 123-31-9
EC-No.: 204-617-8
Index-No.: 604-005-00-4

Hazardous ingredients according to Regulation (EC) No 1272/2008

<table>
<thead>
<tr>
<th>Component</th>
<th>Classification</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydroquinone</td>
<td>Acute Tox. 4; Eye Dam. 1; Skin Sens. 1; Muta. 2; Carc. 2; Aquatic Acute 1; Aquatic Chronic 1; H302, H317, H318, H341, H351, H410</td>
<td>&lt;= 100 %</td>
</tr>
</tbody>
</table>

Hazardous ingredients according to Directive 1999/45/EC

<table>
<thead>
<tr>
<th>Component</th>
<th>Classification</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydroquinone</td>
<td>Xn. N, Carc. Cat.3, Mut. Cat.3, R22 - R40 - R41 - R43 - R68 - R50</td>
<td>&lt;= 100 %</td>
</tr>
</tbody>
</table>

For the full text of the H-Statements and R-Phrases mentioned in this Section, see Section 16.
SECTION 4: First aid measures

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
Carbon oxides

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
No data available

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
Use personal protective equipment. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust.
For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up
Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid formation of dust and aerosols.
Provide appropriate exhaust ventilation at places where dust is formed.
For precautions see section 2.2.
7.2 Conditions for safe storage, including any incompatibilities
Store in cool place. Keep container tightly closed in a dry and well-ventilated place.
Air and light sensitive.
Storage class (TRGS 510): Non Combustible Solids

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Components with workplace control parameters

8.2 Exposure controls

Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

The selected protective gloves have to satisfy the specifications of EU Directive 89/686/EEC and the standard EN 374 derived from it.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0,11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0,11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de,
test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).
Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a) Appearance  Form: crystalline
    Colour: colourless

b) Odour  No data available

c) Odour Threshold  No data available

d) pH  3.7 at 70 g/l

e) Melting point/freezing point  Melting point/range: 172 - 175 °C - lit.

f) Initial boiling point and boiling range  285 °C - lit.

g) Flash point  165 °C - closed cup

h) Evaporation rate  No data available

i) Flammability (solid, gas)  No data available

j) Upper/lower flammability or explosive limits  No data available

k) Vapour pressure  1 hPa at 132 °C

l) Vapour density  3.80 - (Air = 1.0)

m) Relative density  1,332 g/cm3

n) Water solubility  50 g/l

o) Partition coefficient: n-octanol/water  log Pow: 0.59

p) Auto-ignition temperature  515,56 °C

q) Decomposition temperature  No data available

r) Viscosity  No data available

s) Explosive properties  No data available

t) Oxidizing properties  No data available

9.2 Other safety information

Bulk density  550 - 650 kg/m3

Solubility in other solvents  Methanol

Diethylether

Relative vapour density  3.80 - (Air = 1.0)

SECTION 10: Stability and reactivity

10.1 Reactivity  No data available

10.2 Chemical stability  Stable under recommended storage conditions.
10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
Air Light.

10.5 Incompatible materials
Strong bases, Strong oxidizing agents

10.6 Hazardous decomposition products
Other decomposition products - No data available
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - 367.3 mg/kg
(OECD Test Guideline 401)
LD50 Dermal - Rabbit - > 2.000 mg/kg
(OECD Test Guideline 402)

Skin corrosion/irritation
No data available

Serious eye damage/eye irritation
Classified according to Regulation (EU) 1272/2008, Annex VI (Table 3.1/3.2)

Respiratory or skin sensitisation
in vivo assay - Mouse
Result: May cause sensitisation by skin contact.
May cause allergic skin reaction.
(OECD Test Guideline 429)

Germ cell mutagenicity
Laboratory experiments have shown mutagenic effects.
In vitro tests showed mutagenic effects

DNA repair
Rat - Liver cells
Result: negative

Mutagenicity (micronucleus test)
Mouse
Result: positive

Carcinogenicity
This product is or contains a component that has been reported to be possibly carcinogenic based on its
IARC, ACGIH, NTP, or EPA classification.

Limited evidence of carcinogenicity in animal studies

IARC: 3 - Group 3: Not classifiable as to its carcinogenicity to humans (Hydroquinone)

Reproductive toxicity
No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available
Additional Information
RTECS: MX3500000

Absorption into the body leads to the formation of methemoglobin which in sufficient concentration causes cyanosis. Onset may be delayed 2 to 4 hours or longer.
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.
Liver - Irregularities - Based on Human Evidence

SECTION 12: Ecological information

12.1 Toxicity
Toxicity to fish LC50 - Oncorhynchus mykiss (rainbow trout) - 0,04 - 0,1 mg/l - 96,0 h
Toxicity to daphnia and other aquatic invertebrates EC50 - Daphnia magna (Water flea) - 0,13 mg/l - 48 h
Toxicity to algae EC50 - Pseudokirchneriella subcapitata (green algae) - 0,335 mg/l - 72 h

12.2 Persistence and degradability
Biodegradability Biotic/Aerobic - Exposure time 14 d
 result: 86 % - Readily biodegradable

12.3 Bioaccumulative potential
Bioaccumulation Leuciscus idus (Golden orfe) - 3 d
 - 50 μg/l
Bioconcentration factor (BCF): 40

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

12.6 Other adverse effects
Very toxic to aquatic life with long lasting effects.

SECTION 13: Disposal considerations

13.1 Waste treatment methods
Product
Offer surplus and non-recyclable solutions to a licensed disposal company. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Contaminated packaging
Dispose of as unused product.

SECTION 14: Transport information

14.1 UN number
ADR/RID: 3077 IMDG: 3077 IATA: 3077

14.2 UN proper shipping name
ADR/RID: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (Hydroquinone)
IMDG: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (Hydroquinone)
IATA: Environmentally hazardous substance, solid, n.o.s. (Hydroquinone)

14.3 Transport hazard class(es)
ADR/RID: 9 IMDG: 9 IATA: 9
14.4 Packaging group
   ADR/RID: III   IMDG: III   IATA: III
14.5 Environmental hazards
   ADR/RID: yes   IMDG Marine pollutant: yes   IATA: yes
14.6 Special precautions for user

Further information
EHS-Mark required (ADR 2.2.9.1.10, IMDG code 2.10.3) for single packagings and combination packagings containing inner packagings with Dangerous Goods > 5L for liquids or > 5kg for solids.

SECTION 15: Regulatory information
This safety datasheet complies with the requirements of Regulation (EC) No. 1907/2006.
15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture
No data available
15.2 Chemical Safety Assessment
For this product a chemical safety assessment was not carried out

SECTION 16: Other information
Full text of H-Statements referred to under sections 2 and 3.
Acute Tox.   Acute toxicity
Aquatic Acute   Acute aquatic toxicity
Aquatic Chronic   Chronic aquatic toxicity
Carc.   Carcinogenicity
Eye Dam.   Serious eye damage
H302   Harmful if swallowed.
H317   May cause an allergic skin reaction.
H318   Causes serious eye damage.
H341   Suspected of causing genetic defects.
H351   Suspected of causing cancer.
H400   Very toxic to aquatic life.
H410   Very toxic to aquatic life with long lasting effects.

Full text of R-phrases referred to under sections 2 and 3
N   Dangerous for the environment
Xn   Harmful
R22   Harmful if swallowed.
R40   Limited evidence of a carcinogenic effect.
R41   Risk of serious damage to eyes.
R43   May cause sensitisation by skin contact.
R50   Very toxic to aquatic organisms.
R68   Possible risk of irreversible effects.

Further information
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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.
SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers

Product name: Cumene hydroperoxide

Product Number: 247502
Brand: Aldrich
REACH No.: A registration number is not available for this substance as the substance or its uses are exempted from registration, the annual tonnage does not require a registration or the registration is envisaged for a later registration deadline.
CAS-No.: 80-15-9

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses: Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet

Company: Sigma-Aldrich Chemie GmbH
Riedstrasse 2
D-89555 STEINHEIM

Telephone: +49 89-6513-1444
Fax: +49 7329-97-2319
E-mail address: eurtechserv@sial.com

1.4 Emergency telephone number

Emergency Phone # 0800 181 7059 (CHEMTREC Deutschland)
+49 (0)696 43508409 (CHEMTREC weltweit)

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

Classification according to Regulation (EC) No 1272/2008
Flammable liquids (Category 3), H226
Organic peroxides (Type F), H242
Acute toxicity, Oral (Category 4), H302
Acute toxicity, Inhalation (Category 3), H331
Acute toxicity, Dermal (Category 4), H312
Skin corrosion (Category 1B), H314
Serious eye damage (Category 1), H318
Specific target organ toxicity - single exposure (Category 3), Respiratory system, H335
Specific target organ toxicity - repeated exposure (Category 2), H333
Aspiration hazard (Category 1), H304
Chronic aquatic toxicity (Category 2), H411

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 Label elements

Labelling according Regulation (EC) No 1272/2008
Signal word: Danger

Hazard statement(s):
- H226: Flammable liquid and vapour.
- H242: Heating may cause a fire.
- H302 + H312: Harmful if swallowed or in contact with skin.
- H304: May be fatal if swallowed and enters airways.
- H314: Causes severe skin burns and eye damage.
- H331: Toxic if inhaled.
- H335: May cause respiratory irritation.
- H373: May cause damage to organs through prolonged or repeated exposure.
- H411: Toxic to aquatic life with long lasting effects.

Precautionary statement(s):
- P210: Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
- P260: Do not breathe dust/ fume/ gas/ mist/ vapours/ spray.
- P280: Wear protective gloves/ protective clothing/ eye protection/ face protection.
- P304 + P340 + P310: IF INHALED: Remove person to fresh air and keep comfortable for breathing. Immediately call a POISON CENTER or doctor/ physician.
- P305 + P351 + P338 + P310: IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a POISON CENTER or doctor/ physician.
- P370 + P378: In case of fire: Use dry powder or dry sand to extinguish.

Supplemental Hazard Statements: none

2.3 Other hazards
This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

SECTION 3: Composition/information on ingredients

3.1 Substances
Synonyms: α,α-Dimethylbenzyl hydroperoxide

Formula: C9H12O2
Molecular weight: 152.19 g/mol
CAS-No.: 80-15-9

Hazardous ingredients according to Regulation (EC) No 1272/2008

<table>
<thead>
<tr>
<th>Component</th>
<th>Classification</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cumene hydroperoxide</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CAS-No.</td>
<td>80-15-9</td>
<td></td>
</tr>
<tr>
<td>EC-No.</td>
<td>201-254-7</td>
<td></td>
</tr>
<tr>
<td>Index-No.</td>
<td>617-002-00-8</td>
<td></td>
</tr>
<tr>
<td>Org. Perox. E; Acute Tox. 4; Acute Tox. 3; Acute Tox. 4; Skin Corr. 1B; STOT RE 2; Aquatic Chronic 2; H242, H302, H331, H312, H314, H373, H411</td>
<td>&gt;= 10 %: Skin Corr. 1B, H314; 3 - &lt; 10 %: Skin Irrit. 2, H315; 3 - &lt; 10 %: Eye Dam. 1, H318; 1 - &lt; 3 %: Eye Irrit. 2, H319; &gt;= 1 %: STOT SE 3,</td>
<td>&gt;= 80 - &lt; 90 %</td>
</tr>
</tbody>
</table>
SECTION 4: First aid measures

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Take off contaminated clothing and shoes immediately. Wash off with soap and plenty of water. Take victim immediately to hospital. Consult a physician.

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If swallowed
Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

SECTION 5: Firefighting measures

5.1 Extinguishing media
Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
Carbon oxides

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
Use water spray to cool unopened containers.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
Wear respiratory protection. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapours accumulating to form explosive concentrations. Vapours can accumulate in low areas. For personal protection see section 8.
6.2 **Environmental precautions**
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 **Methods and materials for containment and cleaning up**
Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations (see section 13).

6.4 **Reference to other sections**
For disposal see section 13.

SECTION 7: Handling and storage

7.1 **Precautions for safe handling**
Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.
Keep away from sources of ignition - No smoking. Take measures to prevent the build up of electrostatic charge. Keep away from heat and sources of ignition.
For precautions see section 2.2.

7.2 **Conditions for safe storage, including any incompatibilities**
Store in original container. Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage. Store in cool place.

Recommended storage temperature 2 - 8 °C
Storage class (TRGS 510): Organic peroxides and self-reacting hazardous materials

7.3 **Specific end use(s)**
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

SECTION 8: Exposure controls/personal protection

8.1 **Control parameters**
Components with workplace control parameters

8.2 **Exposure controls**
**Appropriate engineering controls**
Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product.

**Personal protective equipment**

**Eye/face protection**
Tightly fitting safety goggles. Faceshield (8-inch minimum). Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

**Skin protection**
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

The selected protective gloves have to satisfy the specifications of EU Directive 89/686/EEC and the standard EN 374 derived from it.

**Full contact**
Material: butyl-rubber
Minimum layer thickness: 0,3 mm
Break through time: 480 min
Material tested: Butoject® (KCL 897 / Aldrich Z677647, Size M)

**Splash contact**
Material: Nitrile rubber
Minimum layer thickness: 0,4 mm
Break through time: 240 min
Material tested:Camatri® (KCL 730 / Aldrich Z677442, Size M)
data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de,
test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374,
contact the supplier of the CE approved gloves. This recommendation is advisory only and must
be evaluated by an industrial hygienist and safety officer familiar with the specific situation of
anticipated use by our customers. It should not be construed as offering an approval for any
specific use scenario.

**Body Protection**
Complete suit protecting against chemicals, Flame retardant antistatic protective clothing., The
type of protective equipment must be selected according to the concentration and amount of the
dangerous substance at the specific workplace.

**Respiratory protection**
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator
with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup
to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air
respirator. Use respirators and components tested and approved under appropriate government
standards such as NIOSH (US) or CEN (EU).

**Control of environmental exposure**
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into
the environment must be avoided.

### SECTION 9: Physical and chemical properties

#### 9.1 Information on basic physical and chemical properties

<table>
<thead>
<tr>
<th>Feature</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appearance</td>
<td>Form: liquid</td>
</tr>
<tr>
<td>Odour</td>
<td>No data available</td>
</tr>
<tr>
<td>Odour Threshold</td>
<td>No data available</td>
</tr>
<tr>
<td>pH</td>
<td>No data available</td>
</tr>
<tr>
<td>Melting point/freezing point</td>
<td>No data available</td>
</tr>
<tr>
<td>Initial boiling point and boiling range</td>
<td>100 - 101 °C at 11 hPa - lit.</td>
</tr>
<tr>
<td>Flash point</td>
<td>79 °C - closed cup56,1 °C</td>
</tr>
<tr>
<td>Evaporation rate</td>
<td>No data available</td>
</tr>
<tr>
<td>Flammability (solid, gas)</td>
<td>No data available</td>
</tr>
<tr>
<td>Upper/lower flammability or explosive limits</td>
<td>No data available</td>
</tr>
<tr>
<td>Vapour pressure</td>
<td>0,5 hPa at 55 °C</td>
</tr>
<tr>
<td></td>
<td>&lt; 0,04 hPa at 20 °C</td>
</tr>
<tr>
<td>Vapour density</td>
<td>5,25 - (Air = 1.0)</td>
</tr>
<tr>
<td>Relative density</td>
<td>1,03 g/mL at 25 °C</td>
</tr>
<tr>
<td>Water solubility</td>
<td>soluble</td>
</tr>
<tr>
<td>Partition coefficient: n-octanol/water</td>
<td>No data available</td>
</tr>
<tr>
<td>Auto-ignition temperature</td>
<td>No data available</td>
</tr>
<tr>
<td>Decomposition temperature</td>
<td>70 °C - Self-Accelerating decomposition temperature (SADT)</td>
</tr>
</tbody>
</table>
r) Viscosity No data available
s) Explosive properties No data available
t) Oxidizing properties No data available

9.2 Other safety information
Relative vapour density 5.25 - (Air = 1.0)

SECTION 10: Stability and reactivity

10.1 Reactivity
No data available

10.2 Chemical stability
Self-Accelerating decomposition temperature (SADT) 70°C
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
Do not expose to temperatures above: 40°C
Heat, flames and sparks.

10.5 Incompatible materials
Powdered metals, Organic materials, Heavy metal salts, metal salts, Combustible material, Acids, Alkalis,
Reducing agents, Rust, charcoal, Amines, Copper, Lead, Cobalt/cobalt oxides

10.6 Hazardous decomposition products
Other decomposition products - No data available
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity

Skin corrosion/irritation
No data available

Serious eye damage/eye irritation
No data available

Respiratory or skin sensitisation
No data available

Germ cell mutagenicity
No data available

Carcinogenicity

IARC: 2B - Group 2B: Possibly carcinogenic to humans (Cumene)

Reproductive toxicity
No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

Additional Information
RTECS: MX2450000
SECTION 12: Ecological information

12.1 **Toxicity**
No data available

12.2 **Persistence and degradability**
No data available

12.3 **Bioaccumulative potential**
No data available

12.4 **Mobility in soil**
No data available

12.5 **Results of PBT and vPvB assessment**
This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

12.6 **Other adverse effects**
Toxic to aquatic life with long lasting effects.

SECTION 13: Disposal considerations

13.1 **Waste treatment methods**

**Product**
Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Offer surplus and non-recyclable solutions to a licensed disposal company.

**Contaminated packaging**
Dispose of as unused product.

SECTION 14: Transport information

14.1 **UN number**
ADR/RID: IMDG: 3109 IATA: 3109

14.2 **UN proper shipping name**
ADR/RID:
IMDG: ORGANIC PEROXIDE TYPE F, LIQUID (CUMYL HYDROPEROXIDE)
IATA: Organic peroxide type F, liquid (Cumyl hydroperoxide)

14.3 **Transport hazard class(es)**
ADR/RID: IMDG: 5.2 (8) IATA: 5.2 (HEAT, 8)

14.4 **Packaging group**
ADR/RID: IMDG: - IATA: -

14.5 **Environmental hazards**
ADR/RID: IMDG Marine pollutant: yes IATA: no

14.6 **Special precautions for user**
No data available

SECTION 15: Regulatory information

This safety datasheet complies with the requirements of Regulation (EC) No. 453/2010.

15.1 **Safety, health and environmental regulations/legislation specific for the substance or mixture**

15.2 **Chemical Safety Assessment**
For this product a chemical safety assessment was not carried out
SECTION 16: Other information

Full text of H-Statements referred to under sections 2 and 3.

H226  Flammable liquid and vapour.
H242  Heating may cause a fire.
H302  Harmful if swallowed.
H302 + H312  Harmful if swallowed or in contact with skin
H304  May be fatal if swallowed and enters airways.
H312  Harmful in contact with skin.
H314  Causes severe skin burns and eye damage.
H315  Causes skin irritation.
H318  Causes serious eye damage.
H319  Causes serious eye irritation.
H331  Toxic if inhaled.
H335  May cause respiratory irritation.
H373  May cause damage to organs through prolonged or repeated exposure.
H411  Toxic to aquatic life with long lasting effects.

Further information
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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.
SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers
Product name: Dibutyl phthalate

Product Number: 524980
Brand: Aldrich
Index-No.: 607-318-00-4
REACH No.: 01-2119493042-44-XXXX
CAS-No.: 84-74-2

1.2 Relevant identified uses of the substance or mixture and uses advised against
Identified uses: Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet
Company: Sigma-Aldrich Chemie GmbH
Riedstrasse 2
D-89555 STEINHEIM

Telephone: +49 89-6513-1444
Fax: +49 7329-97-2319
E-mail address: eurtechserv@sial.com

1.4 Emergency telephone number
Emergency Phone # 0800 181 7059 (CHEMTREC Deutschland) +49 (0)696 43508409 (CHEMTREC weltweit)

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture
Classification according to Regulation (EC) No 1272/2008
Reproductive toxicity (Category 1B), H360Df
Acute aquatic toxicity (Category 1), H400

For the full text of the H-Statements mentioned in this Section, see Section 16.

Classification according to EU Directives 67/548/EEC or 1999/45/EC
R61
R62
N Dangerous for the environment
R50

For the full text of the R-phrases mentioned in this Section, see Section 16.

2.2 Label elements
Labelling according Regulation (EC) No 1272/2008
Pictogram

Signal word Danger
Hazard statement(s)
H360Df May damage the unborn child. Suspected of damaging fertility.
H400 Very toxic to aquatic life.

Precautionary statement(s)
P201 Obtain special instructions before use.
P273 Avoid release to the environment.
P308 + P313 IF exposed or concerned: Get medical advice/ attention.

Supplemental Hazard none

Restricted to professional users.

2.3 Other hazards
This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

SECTION 3: Composition/information on ingredients

3.1 Substances

Synonyms:
- n-Butyl phthalate
- Phthalic acid dibutyl ester (DBP)

Formula: \( \text{C}_{16}\text{H}_{22}\text{O}_{4} \)
Molecular weight: 278.34 g/mol
CAS-No.: 84-74-2
EC-No.: 201-557-4
Index-No.: 607-318-00-4
Registration number: 01-2119493042-44-XXXX

Hazardous ingredients according to Regulation (EC) No 1272/2008

<table>
<thead>
<tr>
<th>Component</th>
<th>Classification</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dibutyl phthalate</strong> Included in the Candidate List of Substances of Very High Concern (SVHC) according to Regulation (EC) No. 1907/2006 (REACH)</td>
<td></td>
<td>&lt;= 100 %</td>
</tr>
<tr>
<td>CAS-No.</td>
<td>84-74-2</td>
<td>Repr. 1B; Aquatic Acute 1; H360Df, H400</td>
</tr>
<tr>
<td>EC-No.</td>
<td>201-557-4</td>
<td></td>
</tr>
<tr>
<td>Index-No.</td>
<td>607-318-00-4</td>
<td></td>
</tr>
<tr>
<td>Registration number</td>
<td>01-2119493042-44-XXXX</td>
<td></td>
</tr>
</tbody>
</table>

Hazardous ingredients according to Directive 1999/45/EC

<table>
<thead>
<tr>
<th>Component</th>
<th>Classification</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dibutyl phthalate</strong> Included in the Candidate List of Substances of Very High Concern (SVHC) according to Regulation (EC) No. 1907/2006 (REACH)</td>
<td></td>
<td>&lt;= 100 %</td>
</tr>
<tr>
<td>CAS-No.</td>
<td>84-74-2</td>
<td>T, N, Repr.Cat.2, Repr.Cat.3, R61 - R50 - R62</td>
</tr>
<tr>
<td>EC-No.</td>
<td>201-557-4</td>
<td></td>
</tr>
<tr>
<td>Index-No.</td>
<td>607-318-00-4</td>
<td></td>
</tr>
<tr>
<td>Registration number</td>
<td>01-2119493042-44-XXXX</td>
<td></td>
</tr>
</tbody>
</table>

For the full text of the H-Statements and R-Phrases mentioned in this Section, see Section 16

SECTION 4: First aid measures

4.1 Description of first aid measures

**General advice**
Consult a physician. Show this safety data sheet to the doctor in attendance.

**If inhaled**
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.
In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

SECTION 5: Firefighting measures

5.1 Extinguishing media
Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
Carbon oxides

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
No data available

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
Use personal protective equipment. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up
Soak up with inert absorbent material and dispose of as hazardous waste. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling
Avoid exposure - obtain special instructions before use. Avoid inhalation of vapour or mist. For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Store in cool place. Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated
SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Components with workplace control parameters

8.2 Exposure controls

Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection
Safety glasses with side-shields conforming to EN166 Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove’s outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

The selected protective gloves have to satisfy the specifications of EU Directive 89/686/EEC and the standard EN 374 derived from it.

Full contact
Material: Nature latex/chloroprene
Minimum layer thickness: 0,6 mm
Break through time: 480 min
Material tested: Lapren® (KCL 706 / Aldrich Z677558, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0,11 mm
Break through time: 77 min
Material tested: Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
impervious clothing. The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.
SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

<table>
<thead>
<tr>
<th>Property</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appearance</td>
<td>Form: liquid, clear</td>
</tr>
<tr>
<td></td>
<td>Colour: colourless</td>
</tr>
<tr>
<td>Odour</td>
<td>No data available</td>
</tr>
<tr>
<td>Odour Threshold</td>
<td>No data available</td>
</tr>
<tr>
<td>pH</td>
<td>No data available</td>
</tr>
<tr>
<td>Melting point/freezing point</td>
<td>Melting point/range: -35 °C - lit.</td>
</tr>
<tr>
<td>Initial boiling point and boiling range</td>
<td>340 °C - lit.</td>
</tr>
<tr>
<td>Flash point</td>
<td>171,0 °C - closed cup</td>
</tr>
<tr>
<td>Evaporation rate</td>
<td>No data available</td>
</tr>
<tr>
<td>Flammability (solid, gas)</td>
<td>No data available</td>
</tr>
<tr>
<td>Upper/lower flammability or explosive limits</td>
<td>Lower explosion limit: 0,47 % (V)</td>
</tr>
<tr>
<td>Vapour pressure</td>
<td>1,3 hPa at 147,0 °C</td>
</tr>
<tr>
<td>Vapour density</td>
<td>No data available</td>
</tr>
<tr>
<td>Relative density</td>
<td>1,043 g/cm3 at 25 °C</td>
</tr>
<tr>
<td>Water solubility</td>
<td>0,0114 g/l at 25 °C - OECD Test Guideline 105 - slightly soluble</td>
</tr>
<tr>
<td>Partition coefficient: n-octanol/water</td>
<td>No data available</td>
</tr>
<tr>
<td>Auto-ignition temperature</td>
<td>402,0 °C</td>
</tr>
<tr>
<td>Decomposition temperature</td>
<td>No data available</td>
</tr>
<tr>
<td>Viscosity</td>
<td>18,8 mm2/s at 20 °C -</td>
</tr>
<tr>
<td>Explosive properties</td>
<td>No data available</td>
</tr>
<tr>
<td>Oxidizing properties</td>
<td>No data available</td>
</tr>
</tbody>
</table>

9.2 Other safety information

No data available

SECTION 10: Stability and reactivity

10.1 Reactivity

No data available

10.2 Chemical stability

Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions

No data available

10.4 Conditions to avoid

No data available

10.5 Incompatible materials

Strong oxidizing agents, Nitrates, Bases, acids, Chlorine
10.6 Hazardous decomposition products
Other decomposition products - No data available
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - 8.000 mg/kg
LC50 Inhalation - Rat - 4.250 mg/m3
LD50 Dermal - Rabbit - > 20.860 mg/kg

Skin corrosion/irritation
Skin - Rabbit
Result: No skin irritation
(OECD Test Guideline 404)

Serious eye damage/eye irritation
Eyes - Rabbit
Result: No eye irritation
(OECD Test Guideline 405)

Respiratory or skin sensitisation
Maximisation Test (GPMT) - Guinea pig
Result: Does not cause skin sensitisation.
(OECD Test Guideline 406)

Germ cell mutagenicity
No data available

Carcinogenicity
IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

Reproductive toxicity
Presumed human reproductive toxicant

Overexposure may cause reproductive disorder(s) based on tests with laboratory animals.

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

Additional Information
RTECS: TI0875000
Nausea, Dizziness, Headache, To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Central nervous system -

SECTION 12: Ecological information

12.1 Toxicity

Toxicity to fish
LC50 - Pimephales promelas (fathead minnow) - 0.85 mg/l - 96,0 h
NOEC - Pimephales promelas (fathead minnow) - 0.32 mg/l - 96,0 h

Toxicity to daphnia and other aquatic
LC50 - Daphnia magna (Water flea) - 3,7 mg/l - 48 h
invertebrates

12.2 **Persistence and degradability**
Biodegradability Result: 81 % - Readily biodegradable  
(C.4-C of the COUNCIL REGULATION (EC) No 440/2008)

12.3 **Bioaccumulative potential**
Bioaccumulation Pimephales promelas (fathead minnow) - 11 d  
- 0,0348 mg/l  
Bioconcentration factor (BCF): 2.165  
Remarks: Does not bioaccumulate.

12.4 **Mobility in soil**
No data available

12.5 **Results of PBT and vPvB assessment**
This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

12.6 **Other adverse effects**
Very toxic to aquatic life.  
No data available

### SECTION 13: Disposal considerations

13.1 **Waste treatment methods**

**Product**
Offer surplus and non-recyclable solutions to a licensed disposal company.

**Contaminated packaging**
Dispose of as unused product.

### SECTION 14: Transport information

14.1 **UN number**
| ADR/RID: 3082 | IMDG: 3082 | IATA: 3082 |
14.2 **UN proper shipping name**
| ADR/RID: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. (Dibutyl phthalate) | IMDG: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. (Dibutyl phthalate) | IATA: Environmentally hazardous substance, liquid, n.o.s. (Dibutyl phthalate) |
14.3 **Transport hazard class(es)**
| ADR/RID: 9 | IMDG: 9 | IATA: 9 |
14.4 **Packaging group**
| ADR/RID: III | IMDG: III | IATA: III |
14.5 **Environmental hazards**
| ADR/RID: yes | IMDG Marine pollutant: yes | IATA: yes |
14.6 **Special precautions for user**
No data available

### SECTION 15: Regulatory information

This safety datasheet complies with the requirements of Regulation (EC) No. 1907/2006.

15.1 **Safety, health and environmental regulations/legislation specific for the substance or mixture**

**Authorisations and/or restrictions on use**

Dibutyl phthalate CAS-No.: 84-74-2  
REACH - Candidate List of Substances of Very High Concern for Authorisation (Article 59).
Toxic for reproduction (article 57c)
ED/67/2008
Dibutyl phthalate CAS-No.: 84-74-2
REACH - List of substances subject to authorisation (Annex XIV)
Toxic for reproduction (category 1B)
Sunset Date: 21.02.2015
Dibutyl phthalate CAS-No.: 84-74-2
REACH - Restrictions on the manufacture, placing on the market and use of certain dangerous substances, preparations and articles (Annex XVII)
Toxic to reproduction: category 1B
Restricted to professional users.
See Annex XVII to Regulation (EC) no 1907/2006 for Conditions of restriction
Dibutyl phthalate CAS-No.: 84-74-2
REACH - Restrictions on the manufacture, placing on the market and use of certain dangerous substances, preparations and articles (Annex XVII)
Shall not be used in toys
See Annex XVII to Regulation (EC) no 1907/2006 for Conditions of restriction

15.2 Chemical Safety Assessment
For this product a chemical safety assessment was not carried out

SECTION 16: Other information

Full text of H-Statements referred to under sections 2 and 3.

Aquatic Acute
H360Df May damage the unborn child. Suspected of damaging fertility.
H400 Very toxic to aquatic life.
Repr. Reproductive toxicity

Full text of R-phrases referred to under sections 2 and 3

N Dangerous for the environment
T Toxic
R50 Very toxic to aquatic organisms.
R61 May cause harm to the unborn child.
R62 Possible risk of impaired fertility.
Repr.Cat.2 Toxic to Reproduction Category 2
Repr.Cat.3 Toxic to Reproduction Category 3

Further information
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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.
SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers
Product name: Diethanolamine

Product Number: D8885
Brand: Sigma-Aldrich
Index-No.: 603-071-00-1
REACH No.: A registration number is not available for this substance as the substance or its uses are exempted from registration, the annual tonnage does not require a registration or the registration is envisaged for a later registration deadline.
CAS-No.: 111-42-2

1.2 Relevant identified uses of the substance or mixture and uses advised against
Identified uses: Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet
Company: Sigma-Aldrich Chemie GmbH
Riedstrasse 2
D-89555 STEINHEIM

Telephone: +49 89-6513-1444
Fax: +49 7329-97-2319
E-mail address: eurtechserv@sial.com

1.4 Emergency telephone number
Emergency Phone # 0800 181 7059 (CHEMTREC Deutschland)
+49 (0)696 43508409 (CHEMTREC weltweit)

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture
Classification according to Regulation (EC) No 1272/2008
Acute toxicity, Oral (Category 4), H302
Skin irritation (Category 2), H315
Serious eye damage (Category 1), H318
Specific target organ toxicity - repeated exposure (Category 2), H373
Chronic aquatic toxicity (Category 3), H412

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 Label elements
Labelling according Regulation (EC) No 1272/2008
Pictogram

Signal word Danger
Hazard statement(s)
H302  Harmful if swallowed.
H315  Causes skin irritation.
H318  Causes serious eye damage.
H373  May cause damage to organs through prolonged or repeated exposure.
H412  Harmful to aquatic life with long lasting effects.

Precautionary statement(s)
P260  Do not breathe dust/ fume/ gas/ mist/ vapours/ spray.
P280  Wear eye protection/ face protection.
P301 + P312 + P330  IF SWALLOWED: Call a POISON CENTER/doctor if you feel unwell.
                   Rinse mouth.
P305 + P351 + P338 + P310  IF IN EYES: Rinse cautiously with water for several minutes. Remove
contact lenses, if present and easy to do. Continue rinsing. Immediately
call a POISON CENTER/doctor.

Supplemental Hazard Statements  none

2.3 Other hazards
This substance/mixture contains no components considered to be either persistent, bioaccumulative and
toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

SECTION 3: Composition/information on ingredients

3.1 Substances
Synonyms  : Bis(2-hydroxyethyl)amine
           2,2'-Iminodiethanol

Formula  : C_4H_{11}NO_2
Molecular weight  : 105.14 g/mol
CAS-No.  : 111-42-2
EC-No.  : 203-868-0
Index-No.  : 603-071-00-1

Hazardous ingredients according to Regulation (EC) No 1272/2008

<table>
<thead>
<tr>
<th>Component</th>
<th>Classification</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diethanolamine</td>
<td>Acute Tox. 4; Skin Irrit. 2; Eye Dam. 1; STOT RE 2; Aquatic Chronic 3; H302, H315, H318, H373, H412</td>
<td>&lt;= 100 %</td>
</tr>
</tbody>
</table>

For the full text of the H-Statements mentioned in this Section, see Section 16.

SECTION 4: First aid measures

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.
If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

SECTION 5: Firefighting measures

5.1 Extinguishing media
Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
No data available

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
No data available

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
Use personal protective equipment. Avoid breathing vapours, mist or gas. Ensure adequate ventilation.
Evacuate personnel to safe areas.
For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up
Soak up with inert absorbent material and dispose of as hazardous waste. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Store in cool place. Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.
Air sensitive.

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated
SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Components with workplace control parameters

8.2 Exposure controls

Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection
Tightly fitting safety goggles. Faceshield (8-inch minimum). Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

The selected protective gloves have to satisfy the specifications of EU Directive 89/686/EEC and the standard EN 374 derived from it.

Full contact
Material: Nature latex/chloroprene
Minimum layer thickness: 0,6 mm
Break through time: 480 min
Material tested:Lapren® (KCL 706 / Aldrich Z677558, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0,11 mm
Break through time: 30 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374

If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Complete suit protecting against chemicals. The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.
SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a) Appearance
   Form: viscous liquid
   Colour: colourless

b) Odour
   ammoniacal

c) Odour Threshold
   No data available

d) pH
   11.0 - 12 at 105 g/l at 25 °C

e) Melting point/freezing point
   Melting point/range: 28 °C

f) Initial boiling point and boiling range
   217 °C at 200 hPa

g) Flash point
   138 °C - closed cup

h) Evaporation rate
   No data available

i) Flammability (solid, gas)
   No data available

j) Upper/lower flammability or explosive limits
   Upper explosion limit: 10.6 % (V)
   Lower explosion limit: 1.6 % (V)

k) Vapour pressure
   1 hPa at 108 °C

l) Vapour density
   3.63 - (Air = 1.0)

m) Relative density
   1.097 g/mL at 25 °C

n) Water solubility
   105 g/l at 20 °C - completely soluble

o) Partition coefficient: n-octanol/water
   log Pow: -2.18

p) Auto-ignition temperature
   355 °C at 1.013 hPa

q) Decomposition temperature
   No data available

r) Viscosity
   No data available

s) Explosive properties
   No data available

t) Oxidizing properties
   No data available

9.2 Other safety information

Dissociation constant
   8.92 at 23 °C

Relative vapour density
   3.63 - (Air = 1.0)

SECTION 10: Stability and reactivity

10.1 Reactivity
   No data available

10.2 Chemical stability
   Absorbs carbon dioxide (CO2) from air.
   Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
   No data available

10.4 Conditions to avoid
   No data available
10.5 **Incompatible materials**
Oxidizing agents, Copper, Zinc, Iron

10.6 **Hazardous decomposition products**
Other decomposition products - No data available
Hazardous decomposition products formed under fire conditions. - Carbon oxides, Nitrogen oxides (NOx)
In the event of fire: see section 5

**SECTION 11: Toxicological information**

11.1 **Information on toxicological effects**

**Acute toxicity**
LD50 Oral - Rat - male and female - 1.600 mg/kg
(OECD Test Guideline 401)

LD50 Dermal - Rabbit - 12.200 mg/kg
LD50 Intraperitoneal - Rat - 120 mg/kg
LD50 Intravenous - Rat - 778 mg/kg

**Skin corrosion/irritation**
No data available

**Serious eye damage/eye irritation**
Eyes - Rabbit
Result: Risk of serious damage to eyes.
(OECD Test Guideline 405)

**Respiratory or skin sensitisation**
Maximisation Test - Guinea pig
Did not cause sensitisation on laboratory animals.
(OECD Test Guideline 406)

**Germ cell mutagenicity**
Micronucleus test
lymphocyte
Result: negative

Mutagenicity (micronucleus test)
Mouse - male and female
Result: negative

**Carcinogenicity**
IARC: 2B - Group 2B: Possibly carcinogenic to humans (Diethanolamine)

**Reproductive toxicity**
No data available

**Specific target organ toxicity - single exposure**
Kidney, Liver, Blood

**Specific target organ toxicity - repeated exposure**
No data available

**Aspiration hazard**
No data available

**Additional Information**
Repeated dose Rat - male and female - Oral - LOAEL : 25 mg/kg - OECD Test Guideline 408 toxicity
RTECS: KJ29750000

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.
SECTION 12: Ecological information

12.1 Toxicity
Toxicity to fish LC50 - Pimephales promelas (fathead minnow) - 1.460 mg/l - 96 h
Toxicity to daphnia and other aquatic invertebrates static test EC50 - Daphnia magna (Water flea) - 30,1 mg/l - 48 h

12.2 Persistence and degradability
Biodegradability aerobic - Exposure time 28 d
Result: 93 % - Readily biodegradable (OECD Test Guideline 301F)

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

12.6 Other adverse effects
Harmful to aquatic life with long lasting effects.
No data available

SECTION 13: Disposal considerations

13.1 Waste treatment methods
Product
Offer surplus and non-recyclable solutions to a licensed disposal company.

Contaminated packaging
Dispose of as unused product.

SECTION 14: Transport information

14.1 UN number
ADR/RID: - IMDG: - IATA: -

14.2 UN proper shipping name
ADR/RID: Not dangerous goods IMDG: Not dangerous goods IATA: Not dangerous goods

14.3 Transport hazard class(es)
ADR/RID: - IMDG: - IATA: -

14.4 Packaging group
ADR/RID: - IMDG: - IATA: -

14.5 Environmental hazards
ADR/RID: no IMDG Marine pollutant: no IATA: no

14.6 Special precautions for user
No data available

SECTION 15: Regulatory information

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture
15.2 Chemical safety assessment
For this product a chemical safety assessment was not carried out

SECTION 16: Other information

Full text of H-Statements referred to under sections 2 and 3.

H302 Harmful if swallowed.
H315 Causes skin irritation.
H318 Causes serious eye damage.
H373 May cause damage to organs through prolonged or repeated exposure.
H412 Harmful to aquatic life with long lasting effects.

Further information
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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.
SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers
Product name: Diisobutylene
Product Number: 38180
Brand: Sigma-Aldrich
REACH No.: A registration number is not available for this substance as the substance or its uses are exempted from registration, the annual tonnage does not require a registration or the registration is envisaged for a later registration deadline.
CAS-No.: 25167-70-8

1.2 Relevant identified uses of the substance or mixture and uses advised against
Identified uses: Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet
Company: Sigma-Aldrich Chemie GmbH
Riedstrasse 2
D-89555 STEINHEIM
Telephone: +49 89-6513-1444
Fax: +49 7329-97-2319
E-mail address: eurtechserv@sial.com

1.4 Emergency telephone number
Emergency Phone #: 0800 181 7059 (CHEMTREC Deutschland)
+49 (0)69 3508409 (CHEMTREC weltweit)

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture
Classification according to Regulation (EC) No 1272/2008
Flammable liquids (Category 2), H225
Skin irritation (Category 2), H315
Eye irritation (Category 2), H319
Specific target organ toxicity - single exposure (Category 3), H335
Aspiration hazard (Category 1), H304
Chronic aquatic toxicity (Category 2), H411

For the full text of the H-Statements mentioned in this Section, see Section 16.

Classification according to EU Directives 67/548/EEC or 1999/45/EC
F Highly flammable
Xn Harmful
Xi Irritant
N Dangerous for the environment
R Phrase

For the full text of the R-phrases mentioned in this Section, see Section 16.

2.2 Label elements
Labelling according Regulation (EC) No 1272/2008

Hazard symbol(s)  
F  Highly flammable
Xn  Harmful
N  Dangerous for the environment

R-phrase(s)  
R11  Highly flammable.
R36/37/38  Irritating to eyes, respiratory system and skin.
R51/53  Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.
R65  Harmful: may cause lung damage if swallowed.

S-phrase(s)  
S16  Keep away from sources of ignition - No smoking.
S26  In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
S61  Avoid release to the environment. Refer to special instructions/ Safety data sheets.
S62  If swallowed, do not induce vomiting: seek medical advice immediately and show this container or label.

2.3 Other hazards - none

SECTION 3: Composition/information on ingredients

3.2 Mixtures  
Chemical characterization : Natural product
Synonyms : 2,4,4-Trimethylpent-1-ene + 2,4,4-Trimethylpentene

Formula : C₉H₁₆
Molecular Weight : 112,21 g/mol

Hazardous ingredients according to Regulation (EC) No 1272/2008

<table>
<thead>
<tr>
<th>Component</th>
<th>Classification</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>2,4,4-Trimethylpent-1-ene</td>
<td>Flam. Liq. 2; Aquatic Chronic</td>
<td>50 - 100 %</td>
</tr>
</tbody>
</table>
SECTION 4: First aid measures

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If swallowed
Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
Carbon oxides

5.3 Advice for firefighters
Wear self contained breathing apparatus for fire fighting if necessary.

5.4 Further information
Use water spray to cool unopened containers.
SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
Use personal protective equipment. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapours accumulating to form explosive concentrations. Vapours can accumulate in low areas.
For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up
Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations (see section 13).

6.4 Reference to other sections
For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.
Keep away from sources of ignition - No smoking. Take measures to prevent the build up of electrostatic charge.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Store in cool place. Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.

7.3 Specific end use(s)
A part from the uses mentioned in section 1.2 no other specific uses are stipulated

SECTION 8: Exposure controls/personal protection

8.1 Control parameters
Components with workplace control parameters

8.2 Exposure controls
Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove’s outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.
The selected protective gloves have to satisfy the specifications of EU Directive 89/686/EEC and the standard EN 374 derived from it.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0,4 mm
Break through time: 480 min
Material tested: Camatril® (KCL 730 / Aldrich Z677442, Size M)

Splash contact
Material: Nitrile rubber  
Minimum layer thickness: 0,2 mm  
Break through time: 30 min  
Material tested: Dermatril® P (KCL 743 / Aldrich Z677388, Size M)  
data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de,  
test method: EN374  
If used in solution, or mixed with other substances, and under conditions which differ from EN 374,  
contact the supplier of the CE approved gloves. This recommendation is advisory only and must  
be evaluated by an industrial hygienist and safety officer familiar with the specific situation of  
anticipated use by our customers. It should not be construed as offering an approval for any  
specific use scenario.  

**Body Protection**  
Complete suit protecting against chemicals, Flame retardant antistatic protective clothing, The type  
of protective equipment must be selected according to the concentration and amount of the  
dangerous substance at the specific workplace.  

**Respiratory protection**  
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator  
with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup  
to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air  
respirator. Use respirators and components tested and approved under appropriate government  
standards such as NIOSH (US) or CEN (EU).  

**Control of environmental exposure**  
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into  
the environment must be avoided.  

---

**SECTION 9: Physical and chemical properties**  
**9.1 Information on basic physical and chemical properties**  

| a) | Appearance | Form: clear, liquid  
Colour: colourless  
b) | Odour | no data available  
c) | Odour Threshold | no data available  
d) | pH | no data available  
e) | Melting point/freezing point | no data available  
f) | Initial boiling point and boiling range | 101 - 103 °C  
g) | Flash point | -6 °C - closed cup  
h) | Evaporation rate | no data available  
i) | Flammability (solid, gas) | no data available  
j) | Upper/lower flammability or explosive limits | no data available  
k) | Vapour pressure | no data available  
l) | Vapour density | no data available  
m) | Relative density | 0,716 g/cm3  
n) | Water solubility | no data available  
o) | Partition coefficient: n-octanol/water | no data available  
p) | Auto-ignition temperature | no data available  

SECTION 10: Stability and reactivity

10.1 Reactivity
no data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
no data available

10.4 Conditions to avoid
Heat, flames and sparks. Extremes of temperature and direct sunlight.

10.5 Incompatible materials
Strong oxidizing agents

10.6 Hazardous decomposition products
Other decomposition products - no data available
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
no data available

Skin corrosion/irritation
no data available

Serious eye damage/eye irritation
no data available

Respiratory or skin sensitisation
no data available

Germ cell mutagenicity
no data available

Carcinogenicity
IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

Reproductive toxicity
no data available

Specific target organ toxicity - single exposure
no data available

Specific target organ toxicity - repeated exposure
no data available

Aspiration hazard
no data available

Additional Information
RTECS: Not available
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

SECTION 12: Ecological information

12.1 Toxicity
no data available

12.2 Persistence and degradability
no data available

12.3 Bioaccumulative potential
no data available

12.4 Mobility in soil
no data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects
Toxic to aquatic life.

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product
Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Offer surplus and non-recyclable solutions to a licensed disposal company.

Contaminated packaging
Dispose of as unused product.

SECTION 14: Transport information

14.1 UN number
ADR/RID: 2050 IMDG: 2050 IATA: 2050

14.2 UN proper shipping name
ADR/RID: DIISOBUTYLENE, ISOMERIC COMPOUNDS IMDG: DIISOBUTYLENES, ISOMERIC COMPOUNDS IATA: Diisobutylene, isomeric compound

14.3 Transport hazard class(es)
ADR/RID: 3 IMDG: 3 IATA: 3

14.4 Packaging group
ADR/RID: II IMDG: II IATA: II

14.5 Environmental hazards
ADR/RID: yes IMDG Marine pollutant: yes IATA: no

14.6 Special precautions for user
no data available

SECTION 15: Regulatory information

This safety datasheet complies with the requirements of Regulation (EC) No. 1907/2006.

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture
no data available

15.2 Chemical Safety Assessment
For this product a chemical safety assessment was not carried out
SECTION 16: Other information

Full text of H-Statements referred to under sections 2 and 3.

<table>
<thead>
<tr>
<th>Acquatic Chronic</th>
<th>Chronic aquatic toxicity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asp. Tox.</td>
<td>Aspiration hazard</td>
</tr>
<tr>
<td>Eye Irrit.</td>
<td>Eye irritation</td>
</tr>
<tr>
<td>Flam. Liq.</td>
<td>Flammable liquids</td>
</tr>
<tr>
<td>H225</td>
<td>Highly flammable liquid and vapour.</td>
</tr>
<tr>
<td>H304</td>
<td>May be fatal if swallowed and enters airways.</td>
</tr>
<tr>
<td>H315</td>
<td>Causes skin irritation.</td>
</tr>
<tr>
<td>H319</td>
<td>Causes serious eye irritation.</td>
</tr>
<tr>
<td>H335</td>
<td>May cause respiratory irritation.</td>
</tr>
<tr>
<td>H411</td>
<td>Toxic to aquatic life with long lasting effects.</td>
</tr>
<tr>
<td>Skin Irrit.</td>
<td>Skin irritation</td>
</tr>
<tr>
<td>STOT SE</td>
<td>Specific target organ toxicity - single exposure</td>
</tr>
</tbody>
</table>

Full text of R-phrases referred to under sections 2 and 3

<table>
<thead>
<tr>
<th>F</th>
<th>Highly flammable</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>Dangerous for the environment</td>
</tr>
<tr>
<td>R11</td>
<td>Highly flammable.</td>
</tr>
<tr>
<td>R36/37/38</td>
<td>Irritating to eyes, respiratory system and skin.</td>
</tr>
<tr>
<td>R51/53</td>
<td>Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.</td>
</tr>
<tr>
<td>R65</td>
<td>Harmful: may cause lung damage if swallowed.</td>
</tr>
<tr>
<td>Xn</td>
<td>Harmful</td>
</tr>
</tbody>
</table>

Further information

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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.
SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers
   Product name : 1,2-Dichloroethane

   Product Number : 284505
   Brand : Sigma-Aldrich
   Index-No. : 602-012-00-7
   REACH No. : 01-2119484658-20-XXXX
   CAS-No. : 107-06-2

1.2 Relevant identified uses of the substance or mixture and uses advised against

   Identified uses : Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet

   Company : Sigma-Aldrich Chemie GmbH
              Riedstrasse 2
              D-89555 STEINHEIM

   Telephone : +49 89-6513-1444
   Fax : +49 7329-97-2319
   E-mail address : eurtechserv@sial.com

1.4 Emergency telephone number

   Emergency Phone # : 0800 181 7059 (CHEMTREC Deutschland)
                       +49 (0)696 43508409 (CHEMTREC weltweit)

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

   Classification according to Regulation (EC) No 1272/2008
   Flammable liquids (Category 2), H225
   Acute toxicity, Oral (Category 4), H302
   Acute toxicity, Inhalation (Category 3), H331
   Skin irritation (Category 2), H315
   Eye irritation (Category 2), H319
   Carcinogenicity (Category 1B), H350
   Specific target organ toxicity - single exposure (Category 3), Respiratory system, H335

   For the full text of the H-Statements mentioned in this Section, see Section 16.

   Classification according to EU Directives 67/548/EEC or 1999/45/EC
   F Highly flammable R11
       R45
   Xn Harmful R22
   Xi Irritant R36/37/38
   T Toxic R23

   For the full text of the R-phrases mentioned in this Section, see Section 16.

2.2 Label elements

   Labelling according Regulation (EC) No 1272/2008
SECTION 3: Composition/information on ingredients

3.1 Substances

Synonyms: Ethylene dichloride
Ethylene chloride

Formula: \( \text{C}_2\text{H}_4\text{Cl}_2 \)

Molecular weight: 98.96 g/mol

CAS-No.: 107-06-2

EC-No.: 203-458-1

Index-No.: 602-012-00-7

Registration number: 01-2119484658-20-XXXX

Hazardous ingredients according to Regulation (EC) No 1272/2008

<table>
<thead>
<tr>
<th>Component</th>
<th>Classification</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethylene dichloride</td>
<td>Included in the Candidate List of Substances of Very High Concern (SVHC) according to Regulation (EC) No. 1907/2006 (REACH)</td>
<td>Flam. Liq. 2; Acute Tox. 4; Acute Tox. 3; Skin Irrit. 2; Eye Irrit. 2; Carc. 1B; STOT SE 3; H225, H302, H315, H319, H331, H335, H350</td>
</tr>
</tbody>
</table>

| CAS-No. | 107-06-2 |
| EC-No.  | 203-458-1 |
| Index-No. | 602-012-00-7 |
| Registration number | 01-2119484658-20-XXXX |

Hazardous ingredients according to Directive 1999/45/EC

<table>
<thead>
<tr>
<th>Component</th>
<th>Classification</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethylene dichloride</td>
<td>Included in the Candidate List of Substances of Very High Concern (SVHC) according to Regulation (EC) No. 1907/2006 (REACH)</td>
<td>F, T, Carc. Cat.2, R45 - R11 - R36/37/38 - R23 - R22</td>
</tr>
</tbody>
</table>

| CAS-No. | 107-06-2 |
| EC-No.  | 203-458-1 |
| Index-No. | 602-012-00-7 |
SECTION 4: First aid measures

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Take victim immediately to hospital. Consult a physician.

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If swallowed
Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
Carbon oxides, Hydrogen chloride gas

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
Use water spray to cool unopened containers.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
Wear respiratory protection. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapours accumulating to form explosive concentrations. Vapours can accumulate in low areas. For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

6.3 Methods and materials for containment and cleaning up
Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations (see section 13).

6.4 Reference to other sections
For disposal see section 13.
SECTION 7: Handling and storage

7.1 Precautions for safe handling
Avoid exposure - obtain special instructions before use. Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.
Keep away from sources of ignition - No smoking. Take measures to prevent the build up of electrostatic charge.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Store in cool place. Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

SECTION 8: Exposure controls/personal protection

8.1 Control parameters
Components with workplace control parameters

8.2 Exposure controls
Appropriate engineering controls
Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product.

Personal protective equipment

Eye/face protection
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove’s outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

The selected protective gloves have to satisfy the specifications of EU Directive 89/686/EEC and the standard EN 374 derived from it.

Full contact
Material: Fluorinated rubber
Minimum layer thickness: 0,7 mm
Break through time: 480 min
Material tested: Vitoject® (KCL 890 / Aldrich Z677698, Size M)

Splash contact
Material: butyl-rubber
Minimum layer thickness: 0,3 mm
Break through time: 62 min
Material tested: Buotoject® (KCL 897 / Aldrich Z677647, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de,
test method: EN374

If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.
Body Protection
Complete suit protecting against chemicals, Flame retardant antistatic protective clothing. The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a) Appearance
   Form: clear, liquid
   Colour: colourless

b) Odour
   No data available

c) Odour Threshold
   No data available

d) pH
   No data available

e) Melting point/freezing point
   Melting point/range: -35 °C - lit.

f) Initial boiling point and boiling range
   83 °C - lit.

g) Flash point
   13,0 °C - closed cup - Tested according to Annex V of Directive 67/548/EEC.

h) Evaporation rate
   No data available

i) Flammability (solid, gas)
   No data available

j) Upper/lower flammability or explosive limits
   Upper explosion limit: 16,2 % (V)
   Lower explosion limit: 6,2 % (V)

k) Vapour pressure
   33,3 hPa at 0 °C
   86 hPa at 20 °C - Tested according to Annex V of Directive 67/548/EEC.
   312 hPa at 50 °C

l) Vapour density
   No data available

m) Relative density
   1,256 g/mL at 25 °C - lit.

n) Water solubility
   8,69 g/l at 20 °C - Tested according to Annex V of Directive 67/548/EEC. - slightly soluble 10,3 g/l at 56 °C

o) Partition coefficient: n-octanol/water
   log Pow: 1,48 at 20 °C - Tested according to Annex V of Directive 67/548/EEC.

p) Auto-ignition temperature
   413,0 °C

q) Decomposition temperature
   No data available

r) Viscosity
   No data available

s) Explosive properties
   No data available

t) Oxidizing properties
   No data available

9.2 Other safety information
SECTION 10: Stability and reactivity

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
Heat, flames and sparks. Extremes of temperature and direct sunlight.

10.5 Incompatible materials
Strong oxidizing agents

10.6 Hazardous decomposition products
Other decomposition products - No data available
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - 670,0 mg/kg
LC50 Inhalation - Rat - 4 h - 3,879 mg/l
LD50 Dermal - Rabbit - 2.800 mg/kg

Skin corrosion/irritation
Skin - Rabbit
Result: irritating - 72 h
(Draize Test)

Serious eye damage/eye irritation
Eyes - Rabbit
Result: Moderate eye irritation

Respiratory or skin sensitisation
No data available

Germ cell mutagenicity
Laboratory experiments have shown mutagenic effects.

Ames test
S. typhimurium
Result: positive

Carcinogenicity
Carcinogenicity - Rat - Oral
Tumorigenic: Carcinogenic by RTECS criteria. Gastrointestinal: Tumors. Skin and Appendages: Other: Tumors.

This product is or contains a component that has been reported to be probably carcinogenic based on its IARC, OSHA, ACGIH, NTP, or EPA classification.

Possible human carcinogen
IARC: 2B - Group 2B: Possibly carcinogenic to humans (Ethylene dichloride)
Reproductive toxicity
Reproductive toxicity - Rat - Inhalation
Effects on Fertility: Post-implantation mortality (e.g., dead and/or resorbed implants per total number of implants).

Specific target organ toxicity - single exposure
May cause respiratory irritation.

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

Additional Information
RTECS: K10525000
Acts as a simple asphyxiant by displacing air., anesthetic effects, Difficulty in breathing, Headache, Dizziness, Prolonged or repeated contact with skin may cause: defatting, Dermatitis, Contact with eyes can cause:, Redness, Blurred vision, Provokes tears., Effects due to ingestion may include;, Gastrointestinal discomfort, Central nervous system depression, Paresthesia., Drowsiness, Convulsions, Conjunctivitis., Pulmonary edema. Effects may be delayed., Irregular breathing., Stomach/intestinal disorders, Nausea, Vomiting, Increased liver enzymes., Weakness, Heavy or prolonged skin exposure may result in the absorption of harmful amounts of material.

Pancreas.

SECTION 12: Ecological information

12.1 Toxicity
Toxicity to fish
LC50 - Oncorhynchus mykiss (rainbow trout) - 225,00 mg/l - 96 h
NOEC - Cyprinodon variegatus (sheepshead minnow) - 130 mg/l - 96 h

Toxicity to daphnia and other aquatic invertebrates
EC50 - Daphnia magna (Water flea) - 540,00 mg/l - 24 h

Immobilization EC50 - Daphnia magna (Water flea) - 160 mg/l - 48 h

12.2 Persistence and degradability
Biodegradability
Biotic/Aerobic - Exposure time 21 d
Result: < 20 % - Not readily biodegradable.
Remarks: Not applicable

12.3 Bioaccumulative potential
Bioaccumulation
Lepomis macrochirus (Bluegill) - 14 d
- 95,6 µg/l

Bioconcentration factor (BCF): 2

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

12.6 Other adverse effects
No data available
SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product
Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Offer surplus and non-recyclable solutions to a licensed disposal company.

Contaminated packaging
Dispose of as unused product.

SECTION 14: Transport information

14.1 UN number
ADR/RID: 1184
IMDG: 1184
IATA: 1184

14.2 UN proper shipping name
ADR/RID: ETHYLENE DICHLORIDE
IMDG: ETHYLENE DICHLORIDE
IATA: Ethylene dichloride

14.3 Transport hazard class(es)
ADR/RID: 3 (6.1)
IMDG: 3 (6.1)
IATA: 3 (6.1)

14.4 Packaging group
ADR/RID: II
IMDG: II
IATA: II

14.5 Environmental hazards
ADR/RID: no
IMDG Marine pollutant: no
IATA: no

14.6 Special precautions for user
No data available

SECTION 15: Regulatory information

This safety datasheet complies with the requirements of Regulation (EC) No. 1907/2006.

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture

Authorisations and/or restrictions on use
Ethylene dichloride CAS-No.: 107-06-2
REACH - Candidate List of Substances of Very High Concern for Authorisation (Article 59).
Carcinogenic (article 57a)

15.2 Chemical Safety Assessment
For this product a chemical safety assessment was not carried out

SECTION 16: Other information

Full text of H-Statements referred to under sections 2 and 3.

Acute Tox. Acute toxicity
Carc. Carcinogenicity
Eye Irrit. Eye irritation
Flam. Liq. Flammable liquids
H225 Highly flammable liquid and vapour.
H302 Harmful if swallowed.
H315 Causes skin irritation.
H319 Causes serious eye irritation.
H331 Toxic if inhaled.
H335 May cause respiratory irritation.
H350  May cause cancer.
Skin Irrit.  Skin irritation

**Full text of R-phrases referred to under sections 2 and 3**

<table>
<thead>
<tr>
<th>R-phrase</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>F</td>
<td>Highly flammable</td>
</tr>
<tr>
<td>T</td>
<td>Toxic</td>
</tr>
<tr>
<td>R11</td>
<td>Highly flammable.</td>
</tr>
<tr>
<td>R22</td>
<td>Harmful if swallowed.</td>
</tr>
<tr>
<td>R23</td>
<td>Toxic by inhalation.</td>
</tr>
<tr>
<td>R36/37/38</td>
<td>Irritating to eyes, respiratory system and skin.</td>
</tr>
<tr>
<td>R45</td>
<td>May cause cancer.</td>
</tr>
</tbody>
</table>

**Further information**

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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.
SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers

Product name: 2,5-Di-\textit{tert}-butylhydroquinone

Product Number: 112976
Brand: Aldrich
REACH No.: A registration number is not available for this substance as the substance or its uses are exempted from registration, the annual tonnage does not require a registration or the registration is envisaged for a later registration deadline.
CAS-No.: 88-58-4

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses: Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet

Company: Sigma-Aldrich Chemie GmbH
Riedstrasse 2
D-89555 STEINHEIM

Telephone: +49 89-6513-1444
Fax: +49 7329-97-2319
E-mail address: eurtechserv@sigma.com

1.4 Emergency telephone number

Emergency Phone #: 0800 181 7059 (CHEMTREC Deutschland)
+49 (0)696 43508409 (CHEMTREC weltweit)

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

Classification according to Regulation (EC) No 1272/2008
Acute toxicity, Oral (Category 4), H302
Skin irritation (Category 2), H315
Eye irritation (Category 2), H319
Specific target organ toxicity - single exposure (Category 3), H335

For the full text of the H-Statements mentioned in this Section, see Section 16.

Classification according to EU Directives 67/548/EEC or 1999/45/EC
Xn Harmful R22
Xi Irritant R36/37/38

For the full text of the R-phrases mentioned in this Section, see Section 16.

2.2 Label elements

Labelling according Regulation (EC) No 1272/2008
Pictogram

Signal word Warning
2.3 Other hazards - none

SECTION 3: Composition/information on ingredients

3.1 Substances

<table>
<thead>
<tr>
<th>Component</th>
<th>Classification</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>2,5-Di-tert-butylhydroquinone</td>
<td>Acute Tox. 4; Skin Irrit. 2; Eye Irrit. 2; STOT SE 3; H302, H315, H319, H335</td>
<td>&lt;= 100 %</td>
</tr>
</tbody>
</table>

Hazardous ingredients according to Regulation (EC) No 1272/2008

SECTION 4: First aid measures

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11
4.3 Indication of any immediate medical attention and special treatment needed
no data available

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
Carbon oxides

5.3 Advice for firefighters
Wear self contained breathing apparatus for fire fighting if necessary.

5.4 Further information
no data available

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
Use personal protective equipment. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust. For personal protection see section 8.

6.2 Environmental precautions
Do not let product enter drains.

6.3 Methods and materials for containment and cleaning up
Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid formation of dust and aerosols. Provide appropriate exhaust ventilation at places where dust is formed. For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Store in cool place. Keep container tightly closed in a dry and well-ventilated place.

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Components with workplace control parameters

8.2 Exposure controls

Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection
Safety glasses with side-shields conforming to EN166 Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).
Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove’s outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

The selected protective gloves have to satisfy the specifications of EU Directive 89/686/EEC and the standard EN 374 derived from it.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0,11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0,11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
For nuisance exposures use type P95 (US) or type P1 (EU EN 143) particle respirator. For higher level protection use type OV/AG/P99 (US) or type ABEK-P2 (EU EN 143) respirator cartridges. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Do not let product enter drains.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

<table>
<thead>
<tr>
<th>Description</th>
<th>Property</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Appearance</td>
<td>Form: crystalline</td>
</tr>
<tr>
<td></td>
<td>Colour: beige</td>
</tr>
<tr>
<td>b) Odour</td>
<td>no data available</td>
</tr>
<tr>
<td>c) Odour Threshold</td>
<td>no data available</td>
</tr>
<tr>
<td>d) pH</td>
<td>no data available</td>
</tr>
<tr>
<td>e) Melting point/freezing</td>
<td>Melting point/range: 216 - 218 °C - lit.</td>
</tr>
<tr>
<td>point</td>
<td></td>
</tr>
<tr>
<td>f) Initial boiling point and</td>
<td>no data available</td>
</tr>
<tr>
<td>boiling range</td>
<td></td>
</tr>
<tr>
<td>g) Flash point</td>
<td>no data available</td>
</tr>
<tr>
<td>h) Evaporation rate</td>
<td>no data available</td>
</tr>
<tr>
<td>i) Flammability (solid, gas)</td>
<td>no data available</td>
</tr>
<tr>
<td>j) Upper/lower flammability</td>
<td>no data available</td>
</tr>
<tr>
<td>or</td>
<td></td>
</tr>
</tbody>
</table>
9.2 Other safety information

no data available

SECTION 10: Stability and reactivity

10.1 Reactivity
no data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
no data available

10.4 Conditions to avoid
no data available

10.5 Incompatible materials
Strong oxidizing agents, Strong bases

10.6 Hazardous decomposition products
Other decomposition products - no data available
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - mouse - 1.000 mg/kg

Skin corrosion/irritation
no data available

Serious eye damage/eye irritation
no data available

Respiratory or skin sensitisation
no data available

Germ cell mutagenicity
no data available

Carcinogenicity
Carcinogenicity - Hamster - Oral
Tumorigenic:Neoplastic by RTECS criteria. Gastrointestinal:Tumors.
IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

**Reproductive toxicity**

no data available

**Specific target organ toxicity - single exposure**

Inhalation - May cause respiratory irritation.

**Specific target organ toxicity - repeated exposure**

no data available

**Aspiration hazard**

no data available

**Additional Information**

RTECS: MX5160000

Depending on the intensity and duration of exposure, effects may vary from mild irritation to severe destruction of tissue. Prolonged or repeated exposure can cause: Damage to the lungs. To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

---

**SECTION 12: Ecological information**

12.1 **Toxicity**

no data available

12.2 **Persistence and degradability**

no data available

12.3 **Bioaccumulative potential**

no data available

12.4 **Mobility in soil**

no data available

12.5 **Results of PBT and vPvB assessment**

PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 **Other adverse effects**

no data available

---

**SECTION 13: Disposal considerations**

13.1 **Waste treatment methods**

**Product**

Offer surplus and non-recyclable solutions to a licensed disposal company. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

**Contaminated packaging**

Dispose of as unused product.

---

**SECTION 14: Transport information**

14.1 **UN number**

ADR/RID: -

IMDG: -

IATA: -

14.2 **UN proper shipping name**

ADR/RID: Not dangerous goods

IMDG: Not dangerous goods

IATA: Not dangerous goods

14.3 **Transport hazard class(es)**

ADR/RID: -

IMDG: -

IATA: -
14.4 Packaging group
ADR/RID: -  IMDG: -  IATA: -

14.5 Environmental hazards
ADR/RID: no  IMDG Marine pollutant: no  IATA: no

14.6 Special precautions for user
no data available

SECTION 15: Regulatory information
This safety datasheet complies with the requirements of Regulation (EC) No. 1907/2006.

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture
no data available

15.2 Chemical Safety Assessment
For this product a chemical safety assessment was not carried out

SECTION 16: Other information

Full text of H-Statements referred to under sections 2 and 3.

Acute Tox.  Acute toxicity
Eye Irrit.  Eye irritation
H302  Harmful if swallowed.
H315  Causes skin irritation.
H319  Causes serious eye irritation.
H335  May cause respiratory irritation.
Skin Irrit.  Skin irritation

Full text of R-phrases referred to under sections 2 and 3

Xn  Harmful
R22  Harmful if swallowed.
R36/37/38  Irritating to eyes, respiratory system and skin.

Further information
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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.
SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers
Product name : 1,3-Diphenylguanidine

Product Number : D207756
Brand : Aldrich
Index-No. : 612-149-00-4
REACH No. : A registration number is not available for this substance as the substance or its uses are exempted from registration, the annual tonnage does not require a registration or the registration is envisaged for a later registration deadline.

CAS-No. : 102-06-7

1.2 Relevant identified uses of the substance or mixture and uses advised against
Identified uses : Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet
Company : Sigma-Aldrich Chemie GmbH
Riedstrasse 2
D-89555 STEINHEIM

Telephone : +49 89-6513-1444
Fax : +49 7329-97-2319
E-mail address : eurtechserv@sial.com

1.4 Emergency telephone number
Emergency Phone # : 0800 181 7059 (CHEMTREC Deutschland)
+49 (0)696 43508409 (CHEMTREC weltweit)

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

Classification according to Regulation (EC) No 1272/2008
Acute toxicity, Oral (Category 3), H301
Skin irritation (Category 2), H315
Eye irritation (Category 2), H319
Reproductive toxicity (Category 2), H361f
Specific target organ toxicity - single exposure (Category 3), Respiratory system, H335
Chronic aquatic toxicity (Category 2), H411

For the full text of the H-Statements mentioned in this Section, see Section 16.

Classification according to EU Directives 67/548/EEC or 1999/45/EC
N Dangerous for the environment R51/53
Xn Harmful R62
Xi Irritant R36/37/38
T Toxic R25

For the full text of the R-phrases mentioned in this Section, see Section 16.
2.2 Label elements

Labelling according Regulation (EC) No 1272/2008

Signal word | Danger
---|---
Hazard statement(s)
H301 | Toxic if swallowed.
H315 | Causes skin irritation.
H319 | Causes serious eye irritation.
H335 | May cause respiratory irritation.
H361f | Suspected of damaging fertility.
H411 | Toxic to aquatic life with long lasting effects.

Precautionary statement(s)
P261 | Avoid breathing dust.
P273 | Avoid release to the environment.
P281 | Use personal protective equipment as required.
P301 + P310 | IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician.
P305 + P351 + P338 | IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

Supplemental Hazard Statements
none

2.3 Other hazards

This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

SECTION 3: Composition/information on ingredients

3.1 Substances

| Formula | C_{13}H_{13}N_{3} |
| Molecular weight | 211.26 g/mol |
| CAS-No. | 102-06-7 |
| EC-No. | 203-002-1 |
| Index-No. | 612-149-00-4 |

Hazardous ingredients according to Regulation (EC) No 1272/2008

<table>
<thead>
<tr>
<th>Component</th>
<th>Classification</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,3-Diphenylguanidine</td>
<td>Acute Tox. 3; Skin Irrit. 2; Eye Irrit. 2; Repr. 2; STOT SE 3; Aquatic Chronic 2; H301, H315, H319, H335, H361f, H411</td>
<td>&lt;= 100 %</td>
</tr>
</tbody>
</table>

Hazardous ingredients according to Directive 1999/45/EC

<table>
<thead>
<tr>
<th>Component</th>
<th>Classification</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,3-Diphenylguanidine</td>
<td>T, N, Repr.Cat.3, R25 - R36/37/38 - R51/53 - R62</td>
<td>&lt;= 100 %</td>
</tr>
</tbody>
</table>

For the full text of the H-Statements and R-Phrases mentioned in this Section, see Section 16
SECTION 4: First aid measures

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Take victim immediately to hospital. Consult a physician.

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
Carbon oxides, Nitrogen oxides (NOx)

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
No data available

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
Wear respiratory protection. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust. For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up
Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid formation of dust and aerosols. Provide appropriate exhaust ventilation at places where dust is formed. For precautions see section 2.2.
7.2 Conditions for safe storage, including any incompatibilities
Store in cool place. Keep container tightly closed in a dry and well-ventilated place.

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

SECTION 8: Exposure controls/personal protection

8.1 Control parameters
Components with workplace control parameters

8.2 Exposure controls
Appropriate engineering controls
Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product.

Personal protective equipment

Eye/face protection
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

The selected protective gloves have to satisfy the specifications of EU Directive 89/686/EEC and the standard EN 374 derived from it.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0,11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0,11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.
SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a) Appearance Form: crystalline
b) Odour No data available
c) Odour Threshold No data available
d) pH No data available
e) Melting point/freezing point Melting point/range: 146 - 148 °C - lit.
f) Initial boiling point and boiling range > 250 °C at ca.1.010 hPa - OECD Test Guideline 103
g) Flash point No data available
h) Evaporation rate No data available
i) Flammability (solid, gas) No data available
j) Upper/lower flammability or explosive limits No data available
k) Vapour pressure No data available
l) Vapour density No data available
m) Relative density No data available
n) Water solubility 0,325 g/l at 20 °C - OECD Test Guideline 105 - soluble
o) Partition coefficient: n-octanol/water Pow: 2,42 at 21,1 °C
p) Auto-ignition temperature No data available
q) Decomposition temperature No data available
r) Viscosity No data available
s) Explosive properties No data available
t) Oxidizing properties No data available

9.2 Other safety information

Surface tension ca.58,8 mN/m at 23 °C

SECTION 10: Stability and reactivity

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
No data available

10.5 Incompatible materials
Strong oxidizing agents
10.6 Hazardous decomposition products
Other decomposition products - No data available
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - male - 111 mg/kg
(OECD Test Guideline 401)
LD50 Oral - Rat - female - 107 mg/kg
(OECD Test Guideline 401)
LD50 Dermal - Rabbit - male and female - > 2.000 mg/kg

Skin corrosion/irritation
No data available

Serious eye damage/eye irritation
Eyes - Rabbit
Result: Irritating to eyes. - 24 h
(Draize Test)

Respiratory or skin sensitisation
Maximisation Test (GPMT) - Guinea pig
Result: Does not cause skin sensitisation.
(OECD Test Guideline 406)

Germ cell mutagenicity
in vitro assay
lymphocyte
Result: negative
Result: Not mutagenic in Ames Test
Mutagenicity (in vivo mammalian bone-marrow cytogenetic test, chromosomal analysis)
Rat - male and female
Result: negative

Carcinogenicity
IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

Reproductive toxicity
Suspected human reproductive toxicant

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

Additional Information
Repeated dose toxicity - Mouse - male and female - No observed adverse effect level - 75 mg/kg - Lowest observed adverse effect level - 114 mg/kg
RTECS: MF0875000
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.
SECTION 12: Ecological information

12.1 **Toxicity**
- Toxicity to fish: static test LC50 - Pimephales promelas (fathead minnow) - 4.2 mg/l - 96 h
- Toxicity to daphnia and other aquatic invertebrates: static test EC50 - Daphnia magna (Water flea) - 17 mg/l - 48 h
- Toxicity to algae: static test EC50 - Desmodesmus subspicatus (Scenedesmus subspicatus) - 7.5 mg/l - 72 h
- Toxicity to bacteria: Respiration inhibition EC50 - Sludge Treatment - 147 mg/l - 3 h
  (OECD Test Guideline 209)

12.2 **Persistence and degradability**
- Biodegradability: Biotic/Aerobic - Exposure time 28 d
  Result: 55 - 71% - Not readily biodegradable.
  (OECD Test Guideline 301B)

12.3 **Bioaccumulative potential**
- Bioaccumulation: Cyprinus carpio (Carp) - 42 d
  - 0.1 mg/l
  Bioconcentration factor (BCF): < 2
  (OECD Test Guideline 305C)

12.4 **Mobility in soil**
No data available

12.5 **Results of PBT and vPvB assessment**
This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

12.6 **Other adverse effects**
Toxic to aquatic life with long lasting effects.

SECTION 13: Disposal considerations

13.1 **Waste treatment methods**

Product
Offer surplus and non-recyclable solutions to a licensed disposal company. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Contaminated packaging
Dispose of as unused product.

SECTION 14: Transport information

14.1 **UN number**
ADR/RID: 2811  
IMDG: 2811  
IATA: 2811

14.2 **UN proper shipping name**
ADR/RID: TOXIC SOLID, ORGANIC, N.O.S. (1,3-Diphenylguanidine)  
IMDG: TOXIC SOLID, ORGANIC, N.O.S. (1,3-Diphenylguanidine)  
IATA: Toxic solid, organic, n.o.s. (1,3-Diphenylguanidine)

14.3 **Transport hazard class(es)**
ADR/RID: 6.1  
IMDG: 6.1  
IATA: 6.1

14.4 **Packaging group**
ADR/RID: III  
IMDG: III  
IATA: III
14.5 Environmental hazards
ADR/RID: yes IMDG Marine pollutant: yes IATA: no

14.6 Special precautions for user
No data available

SECTION 15: Regulatory information
This safety datasheet complies with the requirements of Regulation (EC) No. 1907/2006.

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture

15.2 Chemical Safety Assessment
For this product a chemical safety assessment was not carried out

SECTION 16: Other information

Full text of H-Statements referred to under sections 2 and 3.

Acute Tox. Acute toxicity
Aquatic Chronic Chronic aquatic toxicity
Eye Irrit. Eye irritation
H301 Toxic if swallowed.
H315 Causes skin irritation.
H319 Causes serious eye irritation.
H335 May cause respiratory irritation.
H361f Suspected of damaging fertility.
H411 Toxic to aquatic life with long lasting effects.
Repr. Reproductive toxicity
Skin Irrit. Skin irritation

Full text of R-phrases referred to under sections 2 and 3

N Dangerous for the environment
T Toxic
R25 Toxic if swallowed.
R36/37/38 Irritating to eyes, respiratory system and skin.
R51/53 Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.
R62 Possible risk of impaired fertility.
Repr.Cat.3 Toxic to Reproduction Category 3

Further information
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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.
SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers
Product name : tert-Dodecylmercapta

Product Number : 44210
Brand : Aldrich
REACH No. : A registration number is not available for this substance as the substance or its uses are exempted from registration, the annual tonnage does not require a registration or the registration is envisaged for a later registration deadline.
CAS-No. : 25103-58-6

1.2 Relevant identified uses of the substance or mixture and uses advised against
Identified uses : Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet
Company : Sigma-Aldrich Chemie GmbH
Riedstrasse 2
D-89555 STEINHEIM

Telephone : +49 89-6513-1444
Fax : +49 7329-97-2319
E-mail address : eurtechserv@sial.com

1.4 Emergency telephone number
Emergency Phone # : 0800 181 7059 (CHEMTREC Deutschland)
+49 (0)696 43508409 (CHEMTREC weltweit)

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

Classification according to Regulation (EC) No 1272/2008
Skin irritation (Category 2), H315
Eye irritation (Category 2), H319
Acute aquatic toxicity (Category 1), H400
Chronic aquatic toxicity (Category 1), H410

For the full text of the H-Statements mentioned in this Section, see Section 16.

Classification according to EU Directives 67/548/EEC or 1999/45/EC
Xi, N Irritant, Dangerous for the R36/38, R50/53 environment

For the full text of the R-phrases mentioned in this Section, see Section 16.

2.2 Label elements

Labelling according Regulation (EC) No 1272/2008
Pictogram

Signal word Warning
Hazard statement(s)
H315 Causes skin irritation.
H319 Causes serious eye irritation.
H410 Very toxic to aquatic life with long lasting effects.

Precautionary statement(s)
P273 Avoid release to the environment.
P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P501 Dispose of contents/container to an approved waste disposal plant.

Supplemental Hazard Statements
none

2.3 Other hazards
Stench.

SECTION 3: Composition/information on ingredients

3.1 Substances
Formula : C_{12}H_{26}S
Molecular Weight : 202,40 g/mol
CAS-No. : 25103-58-6
EC-No. : 246-619-1

Hazardous ingredients according to Regulation (EC) No 1272/2008

<table>
<thead>
<tr>
<th>Component</th>
<th>Classification</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>tert-Dodecanethiol</td>
<td>Skin Irrit. 2; Eye Irrit. 2; Aquatic Acute 1; Aquatic Chronic 1; H315, H319, H410</td>
<td>&lt;= 100 %</td>
</tr>
<tr>
<td>CAS-No.</td>
<td>25103-58-6</td>
<td></td>
</tr>
<tr>
<td>EC-No.</td>
<td>246-619-1</td>
<td></td>
</tr>
</tbody>
</table>

Hazardous ingredients according to Directive 1999/45/EC

<table>
<thead>
<tr>
<th>Component</th>
<th>Classification</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>tert-Dodecanethiol</td>
<td>Xi, N, R36/38 - R50/53</td>
<td>&lt;= 100 %</td>
</tr>
<tr>
<td>CAS-No.</td>
<td>25103-58-6</td>
<td></td>
</tr>
<tr>
<td>EC-No.</td>
<td>246-619-1</td>
<td></td>
</tr>
</tbody>
</table>

For the full text of the H-Statements and R-Phrases mentioned in this Section, see Section 16

SECTION 4: First aid measures

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11
4.3 Indication of any immediate medical attention and special treatment needed
no data available

SECTION 5: Firefighting measures

5.1 Extinguishing media
Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
Carbon oxides, Sulphur oxides

5.3 Advice for firefighters
Wear self contained breathing apparatus for fire fighting if necessary.

5.4 Further information
no data available

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
Use personal protective equipment. Avoid breathing vapours, mist or gas. Ensure adequate ventilation.
Evacuate personnel to safe areas.
For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the
environment must be avoided.

6.3 Methods and materials for containment and cleaning up
Soak up with inert absorbent material and dispose of as hazardous waste. Keep in suitable, closed
containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.
Normal measures for preventive fire protection.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Store in cool place. Keep container tightly closed in a dry and well-ventilated place. Containers which are
opened must be carefully resealed and kept upright to prevent leakage.

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

SECTION 8: Exposure controls/personal protection

8.1 Control parameters
Components with workplace control parameters

8.2 Exposure controls
Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and
at the end of workday.

Personal protective equipment

Eye/face protection
Safety glasses with side-shields conforming to EN166 Use equipment for eye protection tested
and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).
**Skin protection**
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

The selected protective gloves have to satisfy the specifications of EU Directive 89/686/EEC and the standard EN 374 derived from it.

- **Full contact**
  - Material: Nitrile rubber
  - Minimum layer thickness: 0.4 mm
  - Break through time: > 480 min
  - Material tested: Camatril® (KCL 730 / Aldrich Z677442, Size M)

- **Splash contact**
  - Material: Nitrile rubber
  - Minimum layer thickness: 0.11 mm
  - Break through time: 361 min
  - Material tested:

  data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de,
  test method: EN374
  If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

**Body Protection**
Impervious clothing. The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

**Respiratory protection**
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

**Control of environmental exposure**
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

---

**SECTION 9: Physical and chemical properties**

9.1 **Information on basic physical and chemical properties**

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Appearance</td>
<td>Form: clear, liquid</td>
</tr>
<tr>
<td></td>
<td>Colour: light brown</td>
</tr>
<tr>
<td>b) Odour</td>
<td>Stench.</td>
</tr>
<tr>
<td>c) Odour Threshold</td>
<td>no data available</td>
</tr>
<tr>
<td>d) pH</td>
<td>no data available</td>
</tr>
<tr>
<td>e) Melting point/freezing point</td>
<td>Melting point/range: &lt; -30 °C</td>
</tr>
<tr>
<td>f) Initial boiling point and</td>
<td>227 - 248 °C - lit.</td>
</tr>
<tr>
<td>boiling range</td>
<td></td>
</tr>
<tr>
<td>g) Flash point</td>
<td>97 °C - closed cup</td>
</tr>
<tr>
<td>h) Evaporation rate</td>
<td>no data available</td>
</tr>
<tr>
<td>i) Flammability (solid, gas)</td>
<td>no data available</td>
</tr>
</tbody>
</table>

Aldrich - 44210
9.2 Other safety information

Relative vapour density 6.99 - (Air = 1.0)

SECTION 10: Stability and reactivity

10.1 Reactivity
no data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
no data available

10.4 Conditions to avoid
no data available

10.5 Incompatible materials
Strong oxidizing agents

10.6 Hazardous decomposition products
Other decomposition products - no data available
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - rat - 4.400 - 12.000 mg/kg
LD50 Dermal - rabbit - 12.600 mg/kg

Skin corrosion/irritation
Skin - rabbit
Result: Skin irritation - 24 h

Serious eye damage/eye irritation
Eyes - rabbit
Result: Moderate eye irritation
Respiratory or skin sensitisation
no data available

Germ cell mutagenicity
no data available

Carcinogenicity
IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

Reproductive toxicity
no data available

Specific target organ toxicity - single exposure
no data available

Specific target organ toxicity - repeated exposure
no data available

Aspiration hazard
no data available

Additional Information
RTECS: JR3150000
Nausea, Headache, Vomiting, To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

SECTION 12: Ecological information

12.1 Toxicity
Toxicity to fish LC50 - Salmo salar (Atlantic salmon) - 0,9 mg/l
Toxicity to daphnia and other aquatic invertebrates EC50 - Daphnia - 0,5 mg/l - 48 h
Toxicity to algae EC50 - Desmodesmus subspicatus (green algae) - 81 - 100 mg/l - 72 h

12.2 Persistence and degradability
Biodegradability Result: 10,40 % - Not readily biodegradable.

12.3 Bioaccumulative potential
no data available

12.4 Mobility in soil
no data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects
Very toxic to aquatic life.

SECTION 13: Disposal considerations

13.1 Waste treatment methods
Product
Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material.

Contaminated packaging
Dispose of as unused product.
SECTION 14: Transport information

14.1 UN number
ADR/RID: 3082  IMDG: 3082  IATA: 3334

14.2 UN proper shipping name
ADR/RID: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. (tert-Dodecanethiol)
IMDG: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. (tert-Dodecanethiol)
IATA: Aviation regulated liquid, n.o.s. (tert-Dodecanethiol)

14.3 Transport hazard class(es)
ADR/RID: 9  IMDG: 9  IATA: 9

14.4 Packaging group
ADR/RID: III  IMDG: III  IATA: III

14.5 Environmental hazards
ADR/RID: yes  IMDG Marine pollutant: yes  IATA: no

14.6 Special precautions for user

Further information
EHS-Mark required (ADR 2.2.9.1.10, IMDG code 2.10.3) for single packagings and combination packagings containing inner packagings with Dangerous Goods > 5L for liquids or > 5kg for solids.

SECTION 15: Regulatory information

This safety datasheet complies with the requirements of Regulation (EC) No. 1907/2006.

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture

no data available

15.2 Chemical Safety Assessment
For this product a chemical safety assessment was not carried out

SECTION 16: Other information

Full text of H-Statements referred to under sections 2 and 3.

Aquatic Acute  Acute aquatic toxicity
Aquatic Chronic  Chronic aquatic toxicity
Eye Irrit.  Eye irritation
H315  Causes skin irritation.
H319  Causes serious eye irritation.
H400  Very toxic to aquatic life.
H410  Very toxic to aquatic life with long lasting effects.

Full text of R-phrases referred to under sections 2 and 3

N  Dangerous for the environment
Xi  Irritant
R36/38  Irritating to eyes and skin.
R50/53  Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

Further information
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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held
liable for any damage resulting from handling or from contact with the above product. See www.sigma-
aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.
Safety Data Sheet

Dusantox® 6PPD

1. CHEMICAL PRODUCT & COMPANY IDENTIFICATION

Manufacturer
DUSLO, A. S.
927 03 Šaľa
836 03 Bratislava, Slovakia Republic
Phone (42) 0706/2561 drop 4100
Fax (42) 0706/5643 Fax (42) 0706/3000

Emergency Contact
Chemtrec: 1-800-424-9300 (continental USA)
(1)703-527-3887 (outside continental USA)
Duslo (in Slovakia): 00421/706/754112

Trade Name(s): Dusantox® 6PPD Pastille

Synonyms: 6PPD, 1,4-benzenediamine, N-(1,3-dimethyl-butyl)-N'-phenyl

Chemical Name: N-(1,3-dimethylbutyl) -N'-phenyl-p-phenylenediamine

CAS Number: 793-24-8

Relevant identified uses of the substance or mixture and uses advised against: No further relevant information available.

Application of the substance/the preparation: Rubber Compounding.

Issued By: Sovereign Chemical Company

According to 1907/2006/EC (REACH), 1272/2008/EC (CLP), and GHS

SDS Number: 1174
Date of Issue: November 1, 2013
Revision Number: 10 (Supersedes May 13, 2009)
Change(s): Update to GHS requirement.

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture:
Classification according to Regulation (EC) No 1272/2008
The following Hazard Statements are applicable only to the EU regulations and not the US GHS regulation: H400, H410

GHS09 Environment
Aquatic Acute 1 H400 Very toxic to aquatic life
Aquatic Chronic 1 H410 Very toxic to aquatic life with long lasting effects

GHS07
Eye Irrit. 2 H319 Causes serious eye irritation.

Classification according to Directive 67/548/EEC or Directive 1999/45/EC

Xn; Harmful
R22 Harmful if swallowed.

Xi; Irritant
R36 Irritating to eyes.

N; Dangerous for the environment.
R50/53 Very toxic to aquatic organisms. May cause long-term adverse effects in the aquatic environment.

Information concerning particular hazards for human and environment: Not applicable.
2.2 Label elements
Labeling according to Regulation (EC) No 1272/2008
The product is classified and labeled according to the CLP regulation.

Hazard pictograms

GHS07    GHS09

Signal word:  Warning

Hazard statements
The following Hazard Statements are applicable only to the EU regulations and not the US GHS regulation: H410.
H319    Causes serious eye irritation.
H410    Very toxic to aquatic life with long lasting effects.

Precautionary statements
P280   Wear protective gloves/protective clothing/eye protection/face protection.
P273   Avoid release to the environment.
P264   Wash thoroughly after handling.
P305+P351+P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P337+P313 If eye irritation persists: Get medical advice/attention.
P391   Collect spillage.
P501   Dispose of contents/container in accordance with local/regional/national/international regulations.

Hazard description

WHMIS-symbols

D2B –Toxic material causing other toxic effects

NFPA ratings (scale 0-4)

Health = 2
Fire = 1
Reactivity = 0

HMIS ratings (scale 0-4)

Health = 2
Fire = 1
Reactivity = 0

HMIS Long Term Health Hazard Substances:  Substance is not listed.

2.3 Other hazards

Results of PBT and vPvB assessment

PBT: Not applicable.
vPvB: Not applicable.

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

· CAS No. Description:  793-24-8, N-(1,3-dimethylbutyl) -N'-phenyl-p-phenylenediamine
· Identification number(s)
· EC number:  212-344-0
4. **FIRST AID MEASURES**

4.1 Description of first aid measures

**General information:** Symptoms of poisoning may even occur after several hours; therefore medical observation for at least 48 hours after the accident.

**After inhalation:** Supply fresh air; consult doctor in case of complaints.

**After skin contact**
- Immediately wash with water and soap and rinse thoroughly.
- If skin irritation continues, consult a doctor.

**After eye contact**
- Remove contact lenses if worn.
- Rinse opened eye for several minutes under running water. If symptoms persist, consult a doctor.

**After swallowing**
- Rinse out mouth and then drink plenty of water.
- Do not induce vomiting; call for medical help immediately.

4.2 **Most important symptoms and effects, both acute and delayed:** Gastric or intestinal disorders.

**Hazards:** No further relevant information available.

4.3 **Indication of any immediate medical attention and special treatment needed:** No further relevant information available.

5. **FIRE FIGHTING MEASURES**

5.1 Extinguishing media

**Suitable extinguishing agents:** Use fire extinguishing methods suitable to surrounding conditions.

**For safety reasons unsuitable extinguishing agents:** None.

5.2 Special hazards arising from the substance or mixture:

- Formation of toxic gases is possible during heating or in case of fire.

5.3 Advice for firefighters

**Protective equipment**
- Wear self-contained respiratory protective device.
- Wear fully protective suit.

**Additional information:** Cool endangered receptacles with water spray.

6. **ACCIDENTAL RELEASE MEASURES**

6.1 Personal precautions, protective equipment and emergency procedures

- Wear protective equipment. Keep unprotected persons away.
- Ensure adequate ventilation

6.2 Environmental precautions

- Inform respective authorities in case of seepage into water course or sewage system.
- Do not allow to enter sewers/ surface or ground water.

6.3 Methods and material for containment and cleaning up

- Pick up mechanically.
- Send for recovery or disposal in suitable receptacles.
- Dispose contaminated material as waste according to item 13.

6.4 Reference to other sections

- See Section 7 for information on safe handling.
- See Section 8 for information on personal protection equipment.
- See Section 13 for disposal information.

7. **HANDLING AND STORAGE**

7.1 Precautions for safe handling

- Prevent formation of dust.
- Any unavoidable deposit of dust must be regularly removed.

**Information about fire and explosion protection:** No special measures required.

7.2 Conditions for safe storage, including any incompatibilities

**Storage**
- Requirements to be met by storerooms and receptacles
Store in a cool location.
Protect from humidity and water.
Avoid storage near extreme heat, ignition sources or open flame.

**Information about storage in one common storage facility**
Store away from foodstuffs.
Do not store together with oxidizing and acidic materials.

**Further information about storage conditions:** Store in cool, dry conditions in well-sealed receptacles.

**7.3 Specific end use(s):** No further relevant information available.

### 8. EXPOSURE CONTROLS - PERSONAL PROTECTION

**Additional information about design of technical facilities:** No further data; see item 7.

**8.1 Control parameters**

**Ingredients with limit values that require monitoring at the workplace:** Not required.

**DNELs:** No further relevant information available.

**PNECs:** No further relevant information available.

**Additional information:** The lists valid during the making were used as basis.

**8.2 Exposure controls**

**Personal protective equipment**

**General protective and hygienic measures**
Keep away from foodstuffs, beverages and feed.
Immediately remove all soiled and contaminated clothing
Wash hands before breaks and at the end of work.
Avoid contact with the eyes and skin.

**Respiratory protection**
Use suitable respiratory protective device in case of insufficient ventilation.
Use suitable respiratory protective device when high concentrations are present.

**Protection of hands**

Protective gloves
The glove material has to be impermeable and resistant to the product/ the substance/ the preparation.
Due to missing tests no recommendation to the glove material can be given for the product/ the preparation/ the chemical mixture.
Selection of the glove material on consideration of the penetration times, rates of diffusion and the degradation.

**Material of gloves**
The selection of the suitable gloves does not only depend on the material, but also on further marks of quality and varies from manufacturer to manufacturer.

**Penetration time of glove material**
The exact break through time has to be found out by the manufacturer of the protective gloves and has to be observed.

**Eye protection**

Safety glasses

**Body protection:** Protective work clothing.

**Limitation and supervision of exposure into the environment:** No further relevant information available.

**Risk management measures**
See Section 7 for additional information.
No further relevant information available.

### 9. PHYSICAL AND CHEMICAL PROPERTIES

**9.1 Information on basic physical and chemical properties:**

**General Information**

<table>
<thead>
<tr>
<th>Appearance</th>
<th>Change in Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Form:</strong> Solid.</td>
<td><strong>Melting Point/Melting Range:</strong> Undetermined.</td>
</tr>
<tr>
<td><strong>Color:</strong> Not determined.</td>
<td><strong>Boiling Point/Boiling Range:</strong> Undetermined.</td>
</tr>
<tr>
<td>Property</td>
<td>Value</td>
</tr>
<tr>
<td>-----------------------------------------------</td>
<td>------------------------------</td>
</tr>
<tr>
<td>Odor: Characteristic</td>
<td></td>
</tr>
<tr>
<td>Odor threshold:</td>
<td>Not determined.</td>
</tr>
<tr>
<td>Octanol/Water Partition Coefficient:</td>
<td>Not determined.</td>
</tr>
<tr>
<td>pH Value:</td>
<td>Not applicable.</td>
</tr>
<tr>
<td>Vapor pressure:</td>
<td>Not applicable.</td>
</tr>
<tr>
<td>Flash point:</td>
<td>399°F/204°C.</td>
</tr>
<tr>
<td>Density at 20 °C:</td>
<td>1.06 g/cm³.</td>
</tr>
<tr>
<td>Flammability (solid, gaseous):</td>
<td>Product is not flammable.</td>
</tr>
<tr>
<td>Relative density:</td>
<td>Not determined.</td>
</tr>
<tr>
<td>Ignition temperature:</td>
<td>Not determined.</td>
</tr>
<tr>
<td>Vapor density:</td>
<td>Not applicable.</td>
</tr>
<tr>
<td>Decomposition temperature:</td>
<td>Not determined.</td>
</tr>
<tr>
<td>Evaporation rate</td>
<td>Not applicable.</td>
</tr>
<tr>
<td>Self-igniting:</td>
<td>Not determined.</td>
</tr>
<tr>
<td>Solubility in / Miscibility with water:</td>
<td>Insoluble.</td>
</tr>
<tr>
<td>Danger of explosion:</td>
<td>Product does not present an explosion hazard.</td>
</tr>
<tr>
<td>Viscosity</td>
<td></td>
</tr>
<tr>
<td>Dynamic:</td>
<td>Not applicable.</td>
</tr>
<tr>
<td>Kinematic:</td>
<td>Not applicable.</td>
</tr>
<tr>
<td>Explosion limits</td>
<td></td>
</tr>
<tr>
<td>Lower:</td>
<td>Not determined.</td>
</tr>
<tr>
<td>Upper:</td>
<td>Not determined.</td>
</tr>
<tr>
<td>9.2 Other information:</td>
<td>No further relevant information available.</td>
</tr>
</tbody>
</table>

### 10. STABILITY AND REACTIVITY

10.1 Reactivity
10.2 Chemical stability
   **Thermal decomposition/conditions to be avoided:** No decomposition if used and stored according to specifications.
10.3 Possibility of hazardous reactions: Reacts with strong acids and oxidizing agents.
10.4 Conditions to avoid: No further relevant information available.
10.5 Incompatible materials: No further relevant information available.
10.6 Hazardous decomposition products
   - Nitrogen oxides.
   - Carbon monoxide and carbon dioxide.

### 11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects
   **Acute toxicity**
<table>
<thead>
<tr>
<th>LD/LC50 values relevant for classification:</th>
</tr>
</thead>
<tbody>
<tr>
<td>793-24-8 N-(1,3-dimethylbutyl)-N'-phenyl-p-phenylenediamine</td>
</tr>
<tr>
<td>Oral</td>
</tr>
</tbody>
</table>

   **Primary irritant effect**
   - **On the skin:** Slight irritating effect on skin and mucous membranes.
   - **On the eye:** Irritating effect.
   - **Sensitization:** No sensitizing effects known.

### 12. ECOLOGICAL INFORMATION

12.1 Toxicity
   **Aquatic toxicity:** Toxic for aquatic organisms
12.2 Persistence and degradability: Not easily biodegradable.
12.3 Bio-accumulative potential: No further relevant information available.
12.4 Mobility in soil: No further relevant information available.

**Ecotoxic effects**
   **Remark:** Very toxic for fish.

**Additional ecological information**

**General notes**
   This statement was deduced from products with a similar structure or composition.
   Avoid transfer into the environment.
   Due to available data on eliminability/decomposition and bioaccumulation potential prolonged term damage of the environment cannot be excluded.
   Do not allow undiluted product or large quantities of it to reach ground water, water course or sewage system.
   Also poisonous for fish and plankton in water bodies.
   Very toxic for aquatic organisms
12.5 Results of PBT and vPvB assessment
PBT: Not applicable.
vPvB: Not applicable.
12.6 Other adverse effects: No further relevant information available.

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods
Recommendation
Must not be disposed together with household garbage. Do not allow product to reach sewage system. Can be burned with household garbage after consulting with the waste disposal facility operator and the pertinent authorities and adhering to the necessary technical regulations.

Un-cleaned packaging
Recommendation: Disposal must be made according to official regulations.

14. TRANSPORTATION INFORMATION

14.1 UN-Number
DOT N/A
ADR, IMDG, IATA UN3077

14.2 UN proper shipping name:
DOT N/A
ADR 3077 ENVIRONMENTALLY HAZARDOUS SUBSTANCE SOLID, N.O.S (N-(1,3-dimethylbutyl) -N'-phenyl-p-phenylenediamine)
IMDG ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S (N-(1,3-dimethylbutyl) -N'-phenyl-p-phenylenediamine), MARINE POLLUTANT
IATA ENVIRONMENTALLY HAZARDOUS SUBSTANCE SOLID, N.O.S (N-(1,3-dimethylbutyl) N'-phenyl-p-phenylenediamine)

14.3 Transport hazard class(es)
DOT, Class N/A
ADR

Class 9 (M7) Miscellaneous dangerous substances and articles.
Label 9
IMDG, IATA

Class 9 Miscellaneous dangerous substances and articles.
Label 9

14.4 Packing group
DOT N/A
ADR, IMDG, IATA III

14.5 Environmental hazards
Product contains environmentally hazardous substances: (N-(1,3-dimethylbutyl) N'-phenyl-p-phenylenediamine)

Marine pollutant Yes
Symbol (fish and tree)
Special Marking (ADR) Symbol (fish and tree)
Special Marking (IATA) Symbol (fish and tree)

14.6 Special precautions for user 
Warning: Miscellaneous dangerous substances and articles
Danger code (Kemler) 90
EMS Number F-A, S-F.

14.7 Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code: Not applicable.
Transport/Additional information
ADR
Limited quantities (LQ) 5 kg
Transport category 3
Tunnel restriction code E
UN "Model Regulation" UN3077, ENVIRONMENT ALLY HAZ ARDO US SUBSTANCE, SOLID, N.O.S. (N-isopropyl-N'-phenyl-p-phenylenediamine), 9, III

15. REGULATORY INFORMATION

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture
United States (USA)

<table>
<thead>
<tr>
<th>Regulation/Standard</th>
<th>Substance Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>SARA Section 355 (extremely hazardous substances)</td>
<td>Substance is not listed.</td>
</tr>
<tr>
<td>SARA Section 313 (Specific toxic chemical listings)</td>
<td>Substance is not listed.</td>
</tr>
<tr>
<td>TSCA (Toxic Substances Control Act)</td>
<td>Substance is listed.</td>
</tr>
<tr>
<td>Proposition 65 (California)</td>
<td>Substance is not listed.</td>
</tr>
<tr>
<td>Chemicals known to cause cancer</td>
<td>Substance is not listed.</td>
</tr>
<tr>
<td>Chemicals known to cause reproductive toxicity for females</td>
<td>Substance is not listed.</td>
</tr>
<tr>
<td>Chemicals known to cause reproductive toxicity for males</td>
<td>Substance is not listed.</td>
</tr>
<tr>
<td>Chemicals known to cause developmental toxicity</td>
<td>Substance is not listed.</td>
</tr>
<tr>
<td>Carcinogenic Categories</td>
<td>Substance is not listed.</td>
</tr>
<tr>
<td>EPA (Environmental Protection Agency)</td>
<td>Substance is not listed.</td>
</tr>
<tr>
<td>IARC (International Agency for Research on Cancer)</td>
<td>Substance is not listed.</td>
</tr>
<tr>
<td>TLV (Threshold Limit Value established by ACGIH)</td>
<td>Substance is not listed.</td>
</tr>
<tr>
<td>NIOSH-Ca (National Institute for Occupational Safety and Health)</td>
<td>Substance is not listed.</td>
</tr>
<tr>
<td>OSHA-Ca (Occupational Safety &amp; Health Administration)</td>
<td>Substance is not listed.</td>
</tr>
<tr>
<td>Canada</td>
<td></td>
</tr>
<tr>
<td>Canadian Domestic Substances List (DSL)</td>
<td>Substance is listed.</td>
</tr>
<tr>
<td>Canadian Ingredient Disclosure list (limit 0.1%)</td>
<td>Substance is not listed.</td>
</tr>
<tr>
<td>Canadian Ingredient Disclosure list (limit 1%)</td>
<td>Substance is not listed.</td>
</tr>
</tbody>
</table>

15.2 Chemical safety assessment: A Chemical Safety Assessment has not been carried out.

16. OTHER INFORMATION

This information is based on our present knowledge. However, this shall not constitute a guarantee for any specific product features and shall not establish a legally valid contractual relationship.

Abbreviations and acronyms
ADR: Accord européen sur le transport des marchandises dangereuses par Route (European Agreement concerning the International Carriage of Dangerous Goods by Road)
IMDG: International Maritime Code for Dangerous Goods
DOT: US Department of Transportation
IATA: International Air Transport Association
GHS: Globally Harmonized System of Classification and Labeling of Chemicals
ACGIH: American Conference of Governmental Industrial Hygienists
EINECS: European Inventory of Existing Commercial Chemical Substances
CAS: Chemical Abstracts Service (division of the American Chemical Society)
NFPA: National Fire Protection Association (USA)
HMIS: Hazardous Materials Identification System (USA)
WHMIS: Workplace Hazardous Materials Information System (Canada)
LC50: Lethal concentration, 50 percent
LD50: Lethal dose, 50 percent

Sources
SDS Prepared by ChemTel Inc.
1305 North Florida Avenue
Tampa, Florida USA 33602-2902
Toll Free North America 1-888-255-3924 Intl. +01 813-248-0573
Website: www.chemtelinc.com
Safety Data Sheet

Sovchem® ETU

1. CHEMICAL PRODUCT & COMPANY IDENTIFICATION

<table>
<thead>
<tr>
<th>Manufacturer:</th>
<th>Emergency Contact:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sovereign Chemical Company</td>
<td>Chemtrec: 1-800-424-9300 (continental USA)</td>
</tr>
<tr>
<td>1225 West Market Street</td>
<td>(1)703-527-3887 (outside continental USA)</td>
</tr>
<tr>
<td>Akron, OH 44313</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Trade Name(s):</th>
<th>Synonyms:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sovchem® ETU Oiled Powder</td>
<td>ETU, 2-mercaptoimidazoline, 2-imidazolidinethione</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Chemical Name:</th>
<th>CAS Number:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethylene thiourea</td>
<td>96-45-7</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Relevant identified uses of the substance or mixture and uses advised against:</th>
<th>Application of the substance/the preparation:</th>
</tr>
</thead>
<tbody>
<tr>
<td>No further relevant information available.</td>
<td>Chemicals for synthesis.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Issued By:</th>
<th>SDS Number:</th>
</tr>
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<tbody>
<tr>
<td>Sovereign Chemical Company</td>
<td>1843</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Date of Issue:</th>
<th>Revision Number:</th>
</tr>
</thead>
<tbody>
<tr>
<td>June 24, 2013</td>
<td>2 (supersedes August 17, 2010)</td>
</tr>
</tbody>
</table>

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

Classification according to Regulation (EC) No 1272/2008

The following Hazard Statements are applicable only to the EU regulations and not the US GHS regulation: H360D.

The following Hazard Statements are applicable only according to OSHA regulations within the United States.

These Statements are not applicable for the CLP regulation (1272/2008/EC) in the EU. H360.

- H360: May damage fertility or the unborn child

GHS08 Health hazard
Repr. 1B H360D May damage the unborn child.

GHS07
Acute Tox. 4 H302 Harmful if swallowed.

Classification according to Directive 67/548/EEC or Directive 1999/45/EC

- T; Toxic
- Repr. Cat.2
- R61: May cause harm to the unborn child.

- Xn; Harmful
- R22 Harmful if swallowed.

Information concerning particular hazards for human and environment: Not applicable.
2.2 Label elements

Labeling according to Regulation (EC) No 1272/2008

The substance is classified and labeled according to the CLP regulation.

Hazard pictograms

![GHS07](image1) ![GHS08](image2)

Signal word: Danger

Hazard-determining components of labeling: ethylene thiourea

Hazard statements

The following Hazard Statements are applicable only to the EU regulations and not the US GHS regulation: H360D.

- **H360**: May damage fertility or the unborn child. (USA)
- **H302**: Harmful if swallowed.
- **H360D**: May damage the unborn child.

Precautionary statements

- **P281**: Use personal protective equipment as required.
- **P264**: Wash thoroughly after handling.
- **P202**: Do not handle until all safety precautions have been read and understood.
- **P301+P312**: IF SWALLOWED: Call a POISON CENTER or doctor/physician if you feel unwell.
- **P308+P313**: IF exposed or concerned: Get medical advice/attention.
- **P330**: Rinse mouth.

Additional information: Restricted to professional users.

Hazard description

WHMIS-symbols

- **D1B**: Toxic material causing immediate and serious toxic effects
- **D2A**: Very toxic material causing other toxic effects

NFPA ratings (scale 0-4)

- Health = 3
- Fire = 1
- Reactivity = 0

HMIS ratings (scale 0-4)

- Health = 3
- Fire = 1
- Reactivity = 0

* - Indicates a long term health hazard from repeated or prolonged exposures.

HMIS Long Term Health Hazard Substances: 96-45-7, ethylene thiourea

2.3 Other hazards

Results of PBT and vPvB assessment

- **PBT**: Not applicable.
- **vPvB**: Not applicable.

### 3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

- **CAS No., Description**: 96-45-7, ethylene thiourea
- **Identification number(s)**
  - EC number: 202-506-9
  - Index number: 613-039-00-9
Dangerous components

| CAS: 8042-47-5 | White Mineral Oil |
| EINECS: 232-455-8 | Xn R65 |
|                | Asp. Tox. 1, H304 |

<5.0%

### 4. FIRST AID MEASURES

#### 4.1 Description of first aid measures

**General information**
Symptoms of poisoning may even occur after several hours; therefore medical observation for at least 48 hours after the accident.

**After inhalation:** Supply fresh air; consult doctor in case of complaints.

**After skin contact**
Immediately wash with water and soap and rinse thoroughly.
If skin irritation continues, consult a doctor.

**After eye contact**
Remove contact lenses if worn.
Rinse opened eye for several minutes under running water. If symptoms persist, consult a doctor.

**After swallowing**
Rinse out mouth and then drink plenty of water.
Do not induce vomiting; call for medical help immediately.
Call for a doctor immediately.

#### 4.2 Most important symptoms and effects, both acute and delayed

- Gastric or intestinal disorders
- Dizziness

**Hazards:** No further relevant information available.

#### 4.3 Indication of any immediate medical attention and special treatment needed

Treat skin and mucous membrane with antihistamine and corticoid preparations.
If necessary oxygen respiration treatment.

### 5. FIRE FIGHTING MEASURES

#### 5.1 Extinguishing media

**Suitable extinguishing agents:** CO2, powder or water spray. Fight larger fires with water spray or alcohol resistant foam.

**For safety reasons unsuitable extinguishing agents:** None.

#### 5.2 Special hazards arising from the substance or mixture

Formation of toxic gases is possible during heating or in case of fire.

#### 5.3 Advice for firefighters

**Protective equipment**
- Wear self-contained respiratory protective device.
- Wear fully protective suit.

**Additional information:** Cool endangered receptacles with water fog or haze.

### 6. ACCIDENTAL RELEASE MEASURES

#### 6.1 Personal precautions, protective equipment and emergency procedures

Use respiratory protective device against the effects of fumes/dust/aerosol.
Ensure adequate ventilation.
Wear protective equipment. Keep unprotected persons away.
Isolate area and prevent access.

**Environmental precautions:** Do not allow to enter sewers/ surface or ground water.

#### 6.3 Methods and material for containment and cleaning up

Pick up mechanically.
Do not flush with water or aqueous cleansing agents.
Dispose contaminated material as waste according to item 13.
6.4 Reference to other sections
See Section 7 for information on safe handling.
See Section 8 for information on personal protection equipment.
See Section 13 for disposal information.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling
Open and handle receptacle with care.
Prevent formation of dust.
Use only in well ventilated areas.
Information about fire and explosion protection: Keep respiratory protective device available.

7.2 Conditions for safe storage, including any incompatibilities

Storage
Requirements to be met by storerooms and receptacles
Store in a cool location.
Avoid storage near extreme heat, ignition sources or open flame.
Use only receptacles specifically permitted for this substance/product.

Information about storage in one common storage facility
Store away from foodstuffs.
Do not store together with oxidizing and acidic materials.
Store away from reducing agents.

Further information about storage conditions
Store in cool, dry conditions in well-sealed receptacles.
Protect from humidity and water.
Store receptacle in a well-ventilated area.

7.3 Specific end use(s): No further relevant information available.

8. EXPOSURE CONTROLS - PERSONAL PROTECTION

Additional information about design of technical facilities: No further data; see item 7.

8.1 Control parameters

Ingredients with limit values that require monitoring at the workplace
96-45-7 ethylene thiourea
REL (USA) Use in encapsulated form; See Pocket Guide App. A.
DNELs No further relevant information available.
PNECs No further relevant information available.

Additional information: The lists valid during the making were used as basis.

8.2 Exposure controls

Personal protective equipment

General protective and hygienic measures:
The usual precautionary measures are to be adhered to when handling chemicals.
Pregnant women should strictly avoid inhalation or skin contact.
Do not inhale dust / smoke / mist.
Keep away from foodstuffs, beverages and feed.
Immediately remove all soiled and contaminated clothing
Wash hands before breaks and at the end of work.
Store protective clothing separately.
Avoid contact with the eyes and skin.

Respiratory protection
Combined Organic Vapor and Particulate Respirator is recommended for use during all processing activities.

Protection of hands
The glove material has to be impermeable and resistant to the product/ the substance/ the preparation.
Selection of the glove material on consideration of the penetration times, rates of diffusion and the degradation.
Material of gloves
Neoprene gloves
Nitrile rubber, NBR
The selection of the suitable gloves does not only depend on the material, but also on further marks of quality and
varies from manufacturer to manufacturer.
Penetration time of glove material
The exact break through time has to be found out by the manufacturer of the protective gloves and has to be
observed.
Eye protection
Safety glasses
Body protection: Impervious protective clothing
Limitation and supervision of exposure into the environment: No further relevant information available.
Risk management measures
See Section 7 for additional information.
No further relevant information available.

9.  PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties
General Information

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appearance</td>
<td></td>
</tr>
<tr>
<td>Form: Powder</td>
<td></td>
</tr>
<tr>
<td>Color: White</td>
<td></td>
</tr>
<tr>
<td>Change in Condition</td>
<td></td>
</tr>
<tr>
<td>Melting Point/Melting Range:</td>
<td>200-203 °C (392-397 °F)</td>
</tr>
<tr>
<td>Boiling Point/Boiling Range:</td>
<td>Undetermined</td>
</tr>
<tr>
<td>Odor: Odorless</td>
<td></td>
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<tr>
<td>Odor threshold: Not determined</td>
<td></td>
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<tr>
<td>pH: Not applicable</td>
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</tr>
<tr>
<td>Solvents: Organic solvents: Not determined</td>
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</tr>
<tr>
<td>Vapor Pressure: Not applicable</td>
<td></td>
</tr>
<tr>
<td>Flash point: Not applicable</td>
<td></td>
</tr>
<tr>
<td>Density at 20 °C: 1.45 g/cm³</td>
<td></td>
</tr>
<tr>
<td>Relative density: Not determined</td>
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<tr>
<td>Ignition temperature: Not determined</td>
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<tr>
<td>Vapor Density: Not applicable</td>
<td></td>
</tr>
<tr>
<td>Decomposition temperature: Not determined</td>
<td></td>
</tr>
<tr>
<td>Evaporation rate: Not applicable</td>
<td></td>
</tr>
<tr>
<td>Self-igniting: Not determined</td>
<td></td>
</tr>
<tr>
<td>Solubility in / Miscibility with water at 20 °C: 19 g/l.</td>
<td></td>
</tr>
<tr>
<td>Danger of explosion: Product does not present an explosion hazard</td>
<td></td>
</tr>
<tr>
<td>Viscosity</td>
<td></td>
</tr>
<tr>
<td>Dynamic: Not applicable</td>
<td></td>
</tr>
<tr>
<td>Kinematic: Not applicable</td>
<td></td>
</tr>
<tr>
<td>Explosion limits</td>
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</tr>
<tr>
<td>Lower: Not determined</td>
<td></td>
</tr>
<tr>
<td>Upper: Not determined</td>
<td></td>
</tr>
</tbody>
</table>

9.2 Other information No further relevant information available.

10.  STABILITY AND REACTIVITY

10.1 Reactivity
10.2 Chemical stability
Thermal decomposition / conditions to be avoided No decomposition if used and stored according to
specifications.
10.3 Possibility of hazardous reactions
Reacts with oxidizing agents.
Toxic fumes may be released if heated above the decomposition point.
10.4 Conditions to avoid: Keep away from heat and direct sunlight.
10.5 Incompatible materials: No further relevant information available.
10.6 Hazardous decomposition products
Sulphur oxides (SOx)
Carbon monoxide and carbon dioxide
Nitrogen oxides.
11. **TOXICOLOGICAL INFORMATION**

11.1 Information on toxicological effects

Acute toxicity

LD/ LC50 values relevant for classification: 96-45-7 ethylene thiourea

Oral LD50 1832 mg/kg (rat)

- Primary irritant effect
  - on the skin: No irritant effect.
  - on the eye: No irritant effect.

- Sensitization: Sensitizing effect by skin contact is possible by prolonged exposure.

Additional toxicological information: Harmful.

Repeated dose toxicity: May cause damage to organs through prolonged or repeated exposure.

CMR effects (carcinogenicity, mutagenicity and toxicity for reproduction): Repr. 1B

12. **ECOLOGICAL INFORMATION**

12.1 Toxicity

Aquatic toxicity: The material is harmful to the environment.

12.2 Persistence and degradability: Biodegradable

12.3 Bioaccumulative potential: Does not accumulate in organisms.

12.4 Mobility in soil: No further relevant information available.

Ecotoxicological effects

Remark: Harmful to water fleas.

Additional ecological information

General notes

The declarations are valid for the component with the highest toxicological risk.

The product may not be released into the environment without control.

Due to available data on eliminability/decomposition and bioaccumulation potential a prolonged damage of the environment is unlikely.

Harmful to aquatic organisms

Water Hazard Class (Self-classification) in the concentrate.

Water hazard class 2 (German Regulation) (Self-assessment): hazardous for water

Do not allow product to reach ground water, water course or sewage system.

Danger to drinking water if even small quantities leak into the ground.

12.5 Results of PBT and vPvB assessment

PBT: Not applicable.

vPvB: Not applicable.

12.6 Other adverse effects: No further relevant information available.

13. **DISPOSAL CONSIDERATIONS**

13.1 Waste treatment methods

Recommendation

Must not be disposed together with household garbage. Do not allow product to reach sewage system.

Can be burned with household garbage after consulting with the waste disposal facility operator and the pertinent authorities and adhering to the necessary technical regulations.

The user of this material has the responsibility to dispose of unused material, residues and containers in compliance with all relevant local, state and federal laws and regulations regarding treatment, storage and disposal for hazardous and nonhazardous wastes. Residual materials should be treated as hazardous.

Uncleaned packaging

Recommendation: Disposal must be made according to official regulations.

Recommended cleansing agents: Water, if necessary together with cleansing agents.
14. TRANSPORTATION INFORMATION

14.1 UN-Number
DOT, ADR, IMDG, IATA
UN3077

14.2 UN proper shipping name
DOT
Environmentally hazardous substances, solid, n.o.s. (Ethylenethiourea)

ADR
3077 ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (Ethylenethiourea)

IMDG
ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (Ethylenethiourea), MARINE POLLUTANT

IATA
ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (Ethylenethiourea)

14.3 Transport hazard class(es)
DOT
Class 9 Miscellaneous dangerous substances and articles.
Label 9

ADR, IMDG, IATA
Class 9 Miscellaneous dangerous substances and articles.
Label 9

14.4 Packing group
DOT, ADR, IMDG, IATA
III

14.5 Environmental hazards
Marine pollutant
Symbol (fish and tree)

Special marking (ADR)
Symbol (fish and tree)

Special marking (IATA)
Symbol (fish and tree)

14.6 Special precautions for user
Warning: Miscellaneous dangerous substances and articles.

14.7 Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code
Not applicable.

Transport/Additional information: This product is non-hazardous for transport for packages less than 10 lbs.

ADR: Limited quantities (LQ)
5 kg

UN "Model Regulation"
UN3077, ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S., 9, III

15. REGULATORY INFORMATION

5.1 Safety, health and environmental regulations/legislation specific for the substance or mixture
United States (USA)

SARA Section 355 (extremely hazardous substances)
Substance is not listed.

SARA Section 313 (Specific toxic chemical listings)
96-45-7 ethylene thiourea

TSCA (Toxic Substances Control Act)
Substance is listed.

Proposition 65 (California)
Chemicals known to cause cancer
96-45-7 ethylene thiourea

Chemicals known to cause reproductive toxicity for females
Substance is not listed.

Chemicals known to cause reproductive toxicity for males
Substance is not listed.

Chemicals known to cause developmental toxicity
96-45-7 ethylene thiourea

Carcinogenic Categories
EPA (Environmental Protection Agency)
Substance is not listed.

IARC (International Agency for Research on Cancer)
96-45-7 ethylene thiourea.

TLV (Threshold Limit Value established by ACGIH)
Substance is not listed.
15.2 Chemical safety assessment: A Chemical Safety Assessment has not been carried out.

16. OTHER INFORMATION

This information is based on our present knowledge. However, this shall not constitute a guarantee for any specific product features and shall not establish a legally valid contractual relationship.

Relevant phrases
H304 May be fatal if swallowed and enters airways.
R65 Harmful: may cause lung damage if swallowed.

Abbreviations and acronyms:
ADR: Accord européen sur le transport des marchandises dangereuses par Route (European Agreement concerning the International Carriage of Dangerous Goods by Road)
IMDG: International Maritime Code for Dangerous Goods
DOT: US Department of Transportation
IATA: International Air Transport Association
GHS: Globally Harmonized System of Classification and Labeling of Chemicals
ACGIH: American Conference of Governmental Industrial Hygienists
EINECS: European Inventory of Existing Commercial Chemical Substances
CAS: Chemical Abstracts Service (division of the American Chemical Society)
NFPA: National Fire Protection Association (USA)
HMIS: Hazardous Materials Identification System (USA)
WHMIS: Workplace Hazardous Materials Information System (Canada)
DNEL: Derived No-Effect Level (REACH)
PNEC: Predicted No-Effect Concentration (REACH)
LC50: Lethal concentration, 50 percent
LD50: Lethal dose, 50 percent

Sources
SDS Prepared by:
ChemTel Inc.
1305 North Florida Avenue
Tampa, Florida USA 33602-2902
Toll Free North America 1-888-255-3924 Intl. +01 813-248-0573
Website: www.chemtelinc.com
SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers

<table>
<thead>
<tr>
<th>Product name</th>
<th>Araldite® 506 epoxy resin</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product Number</td>
<td>A3183</td>
</tr>
<tr>
<td>Brand</td>
<td>Sigma-Aldrich</td>
</tr>
<tr>
<td>Index-No.</td>
<td>603-074-00-8</td>
</tr>
<tr>
<td>REACH No.</td>
<td>A registration number is not available for this substance as the substance or its uses are exempted from registration, the annual tonnage does not require a registration or the registration is envisaged for a later registration deadline.</td>
</tr>
<tr>
<td>CAS-No.</td>
<td>25068-38-6</td>
</tr>
</tbody>
</table>

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses: Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet

<table>
<thead>
<tr>
<th>Company</th>
<th>Sigma-Aldrich Chemie GmbH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Telephone</td>
<td>+49 89-6513-1444</td>
</tr>
<tr>
<td>Fax</td>
<td>+49 7329-97-2319</td>
</tr>
<tr>
<td>E-mail address</td>
<td><a href="mailto:eurtechserv@sial.com">eurtechserv@sial.com</a></td>
</tr>
</tbody>
</table>

1.4 Emergency telephone number

| Emergency Phone #     | 0800 181 7059 (CHEMTREC Deutschland) |
|                       | +49 (0)696 43508409 (CHEMTREC weltweit) |

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

Classification according to Regulation (EC) No 1272/2008

- Skin irritation (Category 2), H315
- Eye irritation (Category 2), H319
- Skin sensitisation (Category 1), H317
- Chronic aquatic toxicity (Category 2), H411

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 Label elements

Labelling according Regulation (EC) No 1272/2008

Pictogram

Signal word: Warning

Hazard statement(s)

H315 Causes skin irritation.
H317   May cause an allergic skin reaction.
H319   Causes serious eye irritation.
H411   Toxic to aquatic life with long lasting effects.

Precautionary statement(s)
P273   Avoid release to the environment.
P280   Wear eye protection/ face protection.
P280   Wear protective gloves.
P333 + P313 If skin irritation or rash occurs: Get medical advice/ attention.
P337 + P313 If eye irritation persists: Get medical advice/ attention.
P391   Collect spillage.

Supplemental Hazard Statements

2.3 Other hazards
This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

SECTION 3: Composition/information on ingredients

3.1 Substances
CAS-No.   : 25068-38-6
Index-No. : 603-074-00-8

Hazardous ingredients according to Regulation (EC) No 1272/2008

<table>
<thead>
<tr>
<th>Component</th>
<th>Classification</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reaction product: bisphenol-A-(epichlorhydrin) and epoxy resin (number average molecular weight &lt;= 700)</td>
<td>Skin Irrit. 2; Eye Irrit. 2; Skin Sens. 1; Aquatic Chronic 2; H315, H319, H317, H411 Concentration limits: &gt;= 5 %: Eye Irrit. 2, H319; &gt;= 5 %: Skin Irrit. 2, H315;</td>
<td>&lt;= 100 %</td>
</tr>
<tr>
<td>CAS-No.</td>
<td>25068-38-6</td>
<td></td>
</tr>
<tr>
<td>EC-No.</td>
<td>500-033-5</td>
<td></td>
</tr>
<tr>
<td>Index-No.</td>
<td>603-074-00-8</td>
<td></td>
</tr>
</tbody>
</table>

For the full text of the H-Statements mentioned in this Section, see Section 16.

SECTION 4: First aid measures

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available
SECTION 5: Firefighting measures

5.1 Extinguishing media

**Suitable extinguishing media**
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
Nature of decomposition products not known.

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
No data available

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
Use personal protective equipment. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up
Soak up with inert absorbent material and dispose of as hazardous waste. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid inhalation of vapour or mist. For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Store in cool place. Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated.

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Components with workplace control parameters

8.2 Exposure controls

**Appropriate engineering controls**
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

**Personal protective equipment**

**Eye/face protection**
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

**Skin protection**
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove’s outer surface) to avoid skin contact with this product. Dispose of
contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

The selected protective gloves have to satisfy the specifications of EU Directive 89/686/EEC and the standard EN 374 derived from it.

**Full contact**
- Material: Nitrile rubber
- Minimum layer thickness: 0.11 mm
- Break through time: 480 min
- Material tested: Dermatril® (KCL 740 / Aldrich Z677272, Size M)

**Splash contact**
- Material: Nitrile rubber
- Minimum layer thickness: 0.11 mm
- Break through time: 480 min
- Material tested: Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374

If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

**Body Protection**
Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

**Respiratory protection**
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

**Control of environmental exposure**
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

SECTION 9: Physical and chemical properties

### 9.1 Information on basic physical and chemical properties

<table>
<thead>
<tr>
<th>a) Appearance</th>
<th>Form: Semi-solid melting to a liquid</th>
</tr>
</thead>
<tbody>
<tr>
<td>b) Odour</td>
<td>No data available</td>
</tr>
<tr>
<td>c) Odour Threshold</td>
<td>No data available</td>
</tr>
<tr>
<td>d) pH</td>
<td>No data available</td>
</tr>
<tr>
<td>e) Melting point/freezing point</td>
<td>-15 - 5 °C</td>
</tr>
<tr>
<td>f) Initial boiling point and boiling range</td>
<td>No data available</td>
</tr>
<tr>
<td>g) Flash point</td>
<td>252 °C</td>
</tr>
<tr>
<td>h) Evaporation rate</td>
<td>No data available</td>
</tr>
<tr>
<td>i) Flammability (solid, gas)</td>
<td>No data available</td>
</tr>
<tr>
<td>j) Upper/lower flammability or explosive limits</td>
<td>No data available</td>
</tr>
</tbody>
</table>
k) Vapour pressure 0,04 hPa at 77 °C
l) Vapour density No data available
m) Relative density 1,168 g/cm³
n) Water solubility No data available
o) Partition coefficient: n-octanol/water log Pow: 2,8
p) Auto-ignition temperature No data available
q) Decomposition temperature No data available
r) Viscosity No data available
s) Explosive properties No data available
t) Oxidizing properties No data available

9.2 Other safety information
No data available

SECTION 10: Stability and reactivity

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
No data available

10.5 Incompatible materials
Strong oxidizing agents, acids, Amines, Bases

10.6 Hazardous decomposition products
Other decomposition products - No data available
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - 13.600 mg/kg

Skin corrosion/irritation
No data available

Serious eye damage/eye irritation
No data available

Respiratory or skin sensitisation

Germ cell mutagenicity
No data available

Ames test
Result: positive

Carcinogenicity
IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

**Reproductive toxicity**
No data available

**Specific target organ toxicity - single exposure**
No data available

**Specific target organ toxicity - repeated exposure**
No data available

**Aspiration hazard**
No data available

**Additional Information**
RTECS: KC2100000

---

**SECTION 12: Ecological information**

**12.1 Toxicity**
No data available

**12.2 Persistence and degradability**
Biodegradability: Result: - According to the results of tests of biodegradability this product is not readily biodegradable.
Remarks: No data available

**12.3 Bioaccumulative potential**
No data available

**12.4 Mobility in soil**
No data available

**12.5 Results of PBT and vPvB assessment**
This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

**12.6 Other adverse effects**
Toxic to aquatic life with long lasting effects.
No data available

---

**SECTION 13: Disposal considerations**

**13.1 Waste treatment methods**

**Product**
Offer surplus and non-recyclable solutions to a licensed disposal company.

**Contaminated packaging**
Dispose of as unused product.

---

**SECTION 14: Transport information**

**14.1 UN number**
ADR/RID: 3082  
IMDG: 3082  
IATA: 3082

**14.2 UN proper shipping name**
ADR/RID: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. (Reaction product: bisphenol-A-(epichlorhydrin) and epoxy resin (number average molecular weight <= 700))
IMDG: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. (Reaction product: bisphenol-A-(epichlorhydrin) and epoxy resin (number average molecular weight <= 700))
IATA: Environmentally hazardous substance, liquid, n.o.s. (Reaction product: bisphenol-A-(epichlorhydrin) and epoxy resin (number average molecular weight <= 700))
14.3 Transport hazard class(es)
ADR/RID: 9  IMDG: 9  IATA: 9
14.4 Packaging group
ADR/RID: III  IMDG: III  IATA: III
14.5 Environmental hazards
ADR/RID: yes  IMDG Marine pollutant: yes  IATA: yes
14.6 Special precautions for user

Further information
EHS-Mark required (ADR 2.2.9.1.10, IMDG code 2.10.3) for single packagings and combination packagings containing inner packagings with Dangerous Goods > 5L for liquids or > 5kg for solids.

SECTION 15: Regulatory information
This safety datasheet complies with the requirements of Regulation (EC) No. 453/2010.
15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture
15.2 Chemical Safety Assessment
For this product a chemical safety assessment was not carried out

SECTION 16: Other information
Full text of H-Statements referred to under sections 2 and 3.
H315 Causes skin irritation.
H317 May cause an allergic skin reaction.
H319 Causes serious eye irritation.
H411 Toxic to aquatic life with long lasting effects.

Further information
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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.
SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers

<table>
<thead>
<tr>
<th>Product name</th>
<th>Ethyl acetate</th>
</tr>
</thead>
</table>

Product Number : 270989  
Brand : Sigma-Aldrich  
Index-No. : 607-022-00-5  
REACH No. : 01-2119475103-46-XXXX  
CAS-No. : 141-78-6

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Chemie GmbH  
Riedstrasse 2  
D-89555 STEINHEIM  
Telephone : +49 89-6513-1444  
Fax : +49 7329-97-2319  
E-mail address : eurtechserv@zial.com

1.4 Emergency telephone number

Emergency Phone # : 0800 181 7059 (CHEMTREC Deutschland)  
+49 (0)696 43508409 (CHEMTREC weltweit)

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

Classification according to Regulation (EC) No 1272/2008

- Flammable liquids (Category 2), H225  
- Eye irritation (Category 2), H319  
- Specific target organ toxicity - single exposure (Category 3), Central nervous system, H336

For the full text of the H-Statements mentioned in this Section, see Section 16.

Classification according to EU Directives 67/548/EEC or 1999/45/EC

| F  | Highly flammable | R11 |
| Xi | Irritant         | R36 |

For the full text of the R-phrases mentioned in this Section, see Section 16.

2.2 Label elements

Labelling according Regulation (EC) No 1272/2008

Pictogram

Signal word : Danger

Hazard statement(s)  
H225 Highly flammable liquid and vapour.
H319 Causes serious eye irritation.
H336 May cause drowsiness or dizziness.

Precautionary statement(s)
P210 Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
P261 Avoid breathing vapours.
P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

Supplemental Hazard information (EU)
EUH066 Repeated exposure may cause skin dryness or cracking.

2.3 Other hazards
This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

SECTION 3: Composition/information on ingredients

3.1 Substances
Formula : C₄H₈O₂
Molecular weight : 88.11 g/mol
CAS-No. : 141-78-6
EC-No. : 205-500-4
Index-No. : 607-022-00-5
Registration number : 01-2119475103-46-XXXX

Hazardous ingredients according to Regulation (EC) No 1272/2008

<table>
<thead>
<tr>
<th>Component</th>
<th>Classification</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethyl acetate</td>
<td>Flam. Liq. 2; Eye Irrit. 2; STOT SE 3; H225, H319, H336, EUH066</td>
<td>&lt;= 100 %</td>
</tr>
</tbody>
</table>

Hazardous ingredients according to Directive 1999/45/EC

<table>
<thead>
<tr>
<th>Component</th>
<th>Classification</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethyl acetate</td>
<td>F, Xi, R11 - R36 - R66 - R67</td>
<td>&lt;= 100 %</td>
</tr>
</tbody>
</table>

For the full text of the H-Statements and R-Phrases mentioned in this Section, see Section 16

SECTION 4: First aid measures

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If swallowed
Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.
4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

SECTION 5: Firefighting measures

5.1 Extinguishing media
Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
No data available

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
Use water spray to cool unopened containers.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
Use personal protective equipment. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapours accumulating to form explosive concentrations. Vapours can accumulate in low areas. For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

6.3 Methods and materials for containment and cleaning up
Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations (see section 13).

6.4 Reference to other sections
For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid inhalation of vapour or mist. Keep away from sources of ignition - No smoking. Take measures to prevent the build up of electrostatic charge. For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Store in cool place. Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage. Storage class (TRGS 510): Flammable liquids

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated
SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Components with workplace control parameters

Derived No Effect Level (DNEL)

<table>
<thead>
<tr>
<th>Application Area</th>
<th>Exposure routes</th>
<th>Health effect</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Workers</td>
<td>Inhalation</td>
<td>Acute systemic effects</td>
<td>1468 mg/m³</td>
</tr>
<tr>
<td>Workers</td>
<td>Inhalation</td>
<td>Acute local effects</td>
<td>1468 mg/m³</td>
</tr>
<tr>
<td>Workers</td>
<td>Skin contact</td>
<td>Long-term systemic effects</td>
<td>63mg/kg BW/d</td>
</tr>
<tr>
<td>Workers</td>
<td>Inhalation</td>
<td>Long-term systemic effects</td>
<td>734 mg/m³</td>
</tr>
<tr>
<td>Workers</td>
<td>Inhalation</td>
<td>Long-term local effects</td>
<td>734 mg/m³</td>
</tr>
<tr>
<td>Consumers</td>
<td>Inhalation</td>
<td>Acute local effects, Acute systemic effects</td>
<td>734 mg/m³</td>
</tr>
<tr>
<td>Consumers</td>
<td>Skin contact</td>
<td>Long-term systemic effects</td>
<td>37mg/kg BW/d</td>
</tr>
<tr>
<td>Consumers</td>
<td>Inhalation</td>
<td>Long-term systemic effects</td>
<td>367 mg/m³</td>
</tr>
<tr>
<td>Consumers</td>
<td>Ingestion</td>
<td>Long-term systemic effects</td>
<td>4,5mg/kg BW/d</td>
</tr>
<tr>
<td>Consumers</td>
<td>Inhalation</td>
<td>Long-term local effects</td>
<td>367 mg/m³</td>
</tr>
</tbody>
</table>

Predicted No Effect Concentration (PNEC)

<table>
<thead>
<tr>
<th>Compartment</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soil</td>
<td>0,24 mg/kg</td>
</tr>
<tr>
<td>Marine water</td>
<td>0,026 mg/l</td>
</tr>
<tr>
<td>Fresh water</td>
<td>0,26 mg/l</td>
</tr>
<tr>
<td>Marine sediment</td>
<td>0,125 mg/kg</td>
</tr>
<tr>
<td>Fresh water sediment</td>
<td>1,25 mg/kg</td>
</tr>
</tbody>
</table>

8.2 Exposure controls

Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

The selected protective gloves have to satisfy the specifications of EU Directive 89/686/EEC and the standard EN 374 derived from it.

Splash contact
Material: butyl-rubber
Minimum layer thickness: 0,3 mm
Break through time: 113 min
Material tested:Butoject® (KCL 897 / Aldrich Z677647, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374

If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of
anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

**Body Protection**
impervious clothing, Flame retardant antistatic protective clothing., The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

**Respiratory protection**
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

**Control of environmental exposure**
Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

---

### SECTION 9: Physical and chemical properties

#### 9.1 Information on basic physical and chemical properties

- **a) Appearance** Form: clear, liquid
  Colour: colourless
- **b) Odour** No data available
- **c) Odour Threshold** No data available
- **d) pH** No data available
- **e) Melting point/freezing point** Melting point/range: -84 °C
- **f) Initial boiling point and boiling range** 76,5 - 77,5 °C
- **g) Flash point** -2,99 °C - closed cup
- **h) Evaporation rate** No data available
- **i) Flammability (solid, gas)** May form explosive dust-air mixture.
- **j) Upper/lower flammability or explosive limits**
  - Upper explosion limit: 11,5 % (V)
  - Lower explosion limit: 2,2 % (V)
- **k) Vapour pressure** 97,3 hPa at 20,0 °C
- **l) Vapour density** No data available
- **m) Relative density** 0,90 g/cm3 at 20 °C
- **n) Water solubility** soluble
- **o) Partition coefficient: n-octanol/water** log Pow: 0,73
- **p) Auto-ignition temperature** 427,0 °C
- **q) Decomposition temperature** No data available
- **r) Viscosity** No data available
- **s) Explosive properties** No data available
- **t) Oxidizing properties** No data available

#### 9.2 Other safety information

- **Surface tension** 24,0 mN/m at 20,0 °C
SECTION 10: Stability and reactivity

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
Heat, flames and sparks.

10.5 Incompatible materials
Strong oxidizing agents

10.6 Hazardous decomposition products
Other decomposition products - No data available
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - 5.620 mg/kg
LC50 Inhalation - Mouse - 2 h - 45.000 mg/m3
LD50 Dermal - Rabbit - > 18.000 mg/kg

Skin corrosion/irritation
Skin - Rabbit
Result: Mild skin irritation
(OECD Test Guideline 404)

Serious eye damage/eye irritation
Classified according to Regulation (EU) 1272/2008, Annex VI (Table 3.1/3.2)

Respiratory or skin sensitisation
No data available

Germ cell mutagenicity
No data available

Carcinogenicity
This product is or contains a component that is not classifiable as to its carcinogenicity based on its IARC, ACGIH, NTP, or EPA classification.

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

Reproductive toxicity
No data available

Specific target organ toxicity - single exposure
May cause drowsiness or dizziness.

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

Additional Information
RTECS: AH5425000
SECTION 12: Ecological information

12.1 Toxicity
Toxicity to fish
- LC50 - Oncorhynchus mykiss (rainbow trout) - 350,00 - 600,00 mg/l - 96 h
- LC50 - Pimephales promelas (fathead minnow) - 220,00 - 250,00 mg/l - 96 h

Toxicity to daphnia and other aquatic invertebrates
- EC50 - Daphnia magna (Water flea) - 2.300,00 - 3.090,00 mg/l - 24 h
- LC50 - Daphnia magna (Water flea) - 560 mg/l - 48 h

Toxicity to algae
- EC50 - Algae - 4.300,00 mg/l - 24 h
- EC50 - SELENASTRUM - 1.800,00 - 3.200,00 mg/l - 72 h

12.2 Persistence and degradability
Biodegradability
- Result: 79 % - Readily biodegradable
  (OECD Test Guideline 301D)

12.3 Bioaccumulative potential
Bioaccumulation
- 3 d

Bioconcentration factor (BCF): 30

12.4 Mobility in soil
- No data available

12.5 Results of PBT and vPvB assessment
This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

12.6 Other adverse effects
- No data available

SECTION 13: Disposal considerations

13.1 Waste treatment methods
Product
- Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Offer surplus and non-recyclable solutions to a licensed disposal company.

Contaminated packaging
- Dispose of as unused product.

SECTION 14: Transport information

14.1 UN number
- ADR/RID: 1173
- IMDG: 1173
- IATA: 1173

14.2 UN proper shipping name
- ADR/RID: ETHYL ACETATE
- IMDG: ETHYL ACETATE
- IATA: Ethyl acetate

14.3 Transport hazard class(es)
- ADR/RID: 3
- IMDG: 3
- IATA: 3
14.4 Packaging group
ADR/RID: II  IMDG: II  IATA: II

14.5 Environmental hazards
ADR/RID: no  IMDG Marine pollutant: no  IATA: no

14.6 Special precautions for user
No data available

SECTION 15: Regulatory information
This safety datasheet complies with the requirements of Regulation (EC) No. 1907/2006.

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture
No data available

15.2 Chemical Safety Assessment
A Chemical Safety Assessment has been carried out for this substance.

SECTION 16: Other information

Full text of H-Statements referred to under sections 2 and 3.
EUH066  Repeated exposure may cause skin dryness or cracking.
Eye Irrit.  Eye irritation
Flam. Liq.  Flammable liquids
H225  Highly flammable liquid and vapour.
H319  Causes serious eye irritation.
H336  May cause drowsiness or dizziness.
STOT SE  Specific target organ toxicity - single exposure

Full text of R-phrases referred to under sections 2 and 3
F  Highly flammable
Xi  Irritant
R11  Highly flammable.
R36  Irritating to eyes.
R66  Repeated exposure may cause skin dryness or cracking.
R67  Vapours may cause drowsiness and dizziness.

Further information
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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.
SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers
   
   Product name: Ethylene glycol dimethacrylate

   Product Number: 335681
   Brand: Aldrich
   Index-No.: 607-114-00-5
   REACH No.: A registration number is not available for this substance as the substance or its uses are exempted from registration, the annual tonnage does not require a registration or the registration is envisaged for a later registration deadline.
   CAS-No.: 97-90-5

1.2 Relevant identified uses of the substance or mixture and uses advised against
   Identified uses: Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet
   Company: Sigma-Aldrich Chemie GmbH
   Riedstrasse 2
   D-89555 STEINHEIM

   Telephone: +49 89-6513-1444
   Fax: +49 7329-97-2319
   E-mail address: eurtechserv@sial.com

1.4 Emergency telephone number
   Emergency Phone #
   0800 181 7059 (CHEMTREC Deutschland)
   +49 (0)696 43508409 (CHEMTREC weltweit)

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture
   Classification according to Regulation (EC) No 1272/2008
   Skin sensitisation (Category 1), H317
   Specific target organ toxicity - single exposure (Category 3), Respiratory system, H335

   For the full text of the H-Statements mentioned in this Section, see Section 16.

   Classification according to EU Directives 67/548/EEC or 1999/45/EC
   R43
   Xi Irritant
   R37

   For the full text of the R-phrases mentioned in this Section, see Section 16.

2.2 Label elements
   Labelling according Regulation (EC) No 1272/2008
   Pictogram

   Signal word: Warning
   Hazard statement(s)
   H317 May cause an allergic skin reaction.
SECTION 3: Composition/information on ingredients

3.1 Substances
Synonyms: 1,2-Ethanediol dimethacrylate
  Ethylene dimethacrylate

Formula: C_{10}H_{14}O_{4}
Molecular weight: 198.22 g/mol
CAS-No.: 97-90-5
EC-No.: 202-617-2
Index-No.: 607-114-00-5

Hazardous ingredients according to Regulation (EC) No 1272/2008

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<tr>
<th>Component</th>
<th>Classification</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethylene dimethacrylate</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CAS-No.</td>
<td>97-90-5</td>
<td></td>
</tr>
<tr>
<td>EC-No.</td>
<td>202-617-2</td>
<td></td>
</tr>
<tr>
<td>Index-No.</td>
<td>607-114-00-5</td>
<td></td>
</tr>
<tr>
<td>Skin Sens. 1; STOT SE 3; H317, H335</td>
<td>&lt;= 100 %</td>
<td></td>
</tr>
</tbody>
</table>

Hazardous ingredients according to Directive 1999/45/EC

<table>
<thead>
<tr>
<th>Component</th>
<th>Classification</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethylene dimethacrylate</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CAS-No.</td>
<td>97-90-5</td>
<td></td>
</tr>
<tr>
<td>EC-No.</td>
<td>202-617-2</td>
<td></td>
</tr>
<tr>
<td>Index-No.</td>
<td>607-114-00-5</td>
<td></td>
</tr>
<tr>
<td>Xi, R37 - R43</td>
<td>&lt;= 100 %</td>
<td></td>
</tr>
</tbody>
</table>

For the full text of the H-Statements and R-Phrases mentioned in this Section, see Section 16

SECTION 4: First aid measures

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Flush eyes with water as a precaution.
If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

SECTION 5: Firefighting measures

5.1 Extinguishing media
Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
Carbon oxides

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
No data available

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
Use personal protective equipment. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up
Soak up with inert absorbent material and dispose of as hazardous waste. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid inhalation of vapour or mist. For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Store in cool place. Keep container tightly closed in a dry and well-ventilated place.
Recommended storage temperature 2 - 8 °C
Storage class (TRGS 510): Combustible liquids

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated
SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Components with workplace control parameters

8.2 Exposure controls

Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

The selected protective gloves have to satisfy the specifications of EU Directive 89/686/EEC and the standard EN 374 derived from it.

Full contact
Material: butyl-rubber
Minimum layer thickness: 0,3 mm
Break through time: 480 min
Material tested:Butoject® (KCL 897 / Aldrich Z677647, Size M)

Splash contact
Material: Nature latex/chloroprene
Minimum layer thickness: 0,6 mm
Break through time: 60 min
Material tested:Lapren® (KCL 706 / Aldrich Z677558, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.
SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a) Appearance
   Form: clear, liquid
   Colour: light yellowcolourless

b) Odour
   ester-like

c) Odour Threshold
   No data available

d) pH
   No data available

e) Melting point/freezing point
   -19,99 °C

f) Initial boiling point and boiling range
   98 - 100 °C at 7 hPa - lit.

g) Flash point
   101,5 °C - closed cup

h) Evaporation rate
   No data available

i) Flammability (solid, gas)
   No data available

j) Upper/lower flammability or explosive limits
   No data available

k) Vapour pressure
   1 hPa at 20 °C

l) Vapour density
   6,84 - (Air = 1.0)

m) Relative density
   1,051 g/cm³ at 25 °C

n) Water solubility
   5 g/l at 20 °C

o) Partition coefficient: n-octanol/water
   log Pow: 1,22

p) Auto-ignition temperature
   No data available

q) Decomposition temperature
   No data available

r) Viscosity
   3,038 mm²/s at 20 °C

s) Explosive properties
   No data available

t) Oxidizing properties
   No data available

9.2 Other safety information

Relative vapour density
6,84 - (Air = 1.0)

SECTION 10: Stability and reactivity

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.
Contains the following stabiliser(s):
Mequinol (>=90 - <110 ppm)

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
May polymerize on exposure to light. Exposure to light.
10.5 Incompatible materials
Strong acids, Strong oxidizing agents, Strong bases, Reducing agents, Amines, Heavy metals, Peroxides, Free radical initiators

10.6 Hazardous decomposition products
Other decomposition products - No data available
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - 3.300 mg/kg

Skin corrosion/irritation
Skin - Rabbit
Result: No skin irritation
(Draize Test)

Serious eye damage/eye irritation
Eyes - Rabbit
Result: No eye irritation
(OECD Test Guideline 405)

Respiratory or skin sensitisation
Germ cell mutagenicity
Mouse
lymphocyte
Mutation in mammalian somatic cells.

Carcinogenicity
IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

Reproductive toxicity
No data available

Specific target organ toxicity - single exposure
May cause respiratory irritation.

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

Additional Information
RTECS: OZ4400000
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

SECTION 12: Ecological information

12.1 Toxicity
Toxicity to fish LC50 - other fish - 15,95 mg/l - 96 h
(OECD Test Guideline 203)
Toxicity to bacteria

12.2 Persistence and degradability
Biodegradability Result: 71,6 % - Readily biodegradable

12.3 Bioaccumulative potential
No data available
12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

12.6 Other adverse effects
Harmful to aquatic life.
No data available

SECTION 13: Disposal considerations

13.1 Waste treatment methods
Product
Offer surplus and non-recyclable solutions to a licensed disposal company.

Contaminated packaging
Dispose of as unused product.

SECTION 14: Transport information

14.1 UN number
ADR/RID: - IMDG: - IATA: 3334

14.2 UN proper shipping name
ADR/RID: Not dangerous goods IMDG: Not dangerous goods IATA: Aviation regulated liquid, n.o.s. (Ethylene dimethacrylate)

14.3 Transport hazard class(es)
ADR/RID: - IMDG: - IATA: 9

14.4 Packaging group
ADR/RID: - IMDG: - IATA: III

14.5 Environmental hazards
ADR/RID: no IMDG Marine pollutant: no IATA: no

14.6 Special precautions for user
No data available

SECTION 15: Regulatory information

This safety datasheet complies with the requirements of Regulation (EC) No. 1907/2006.

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture

15.2 Chemical Safety Assessment
For this product a chemical safety assessment was not carried out

SECTION 16: Other information

Full text of H-statements referred to under sections 2 and 3.

H317 May cause an allergic skin reaction.
H335 May cause respiratory irritation.
Skin Sens. Skin sensitisation
STOT SE Specific target organ toxicity - single exposure

Full text of R-phrases referred to under sections 2 and 3

Xi Irritant
R37 Irritating to respiratory system.
Further information
Copyright 2015 Sigma-Aldrich Co. LLC. License granted to make unlimited paper copies for internal use only.
The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.
SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers

Product name: Ethylene glycol

Product Number: 324558
Brand: Sigma-Aldrich
Index-No.: 603-027-00-1
REACH No.: 01-2119456816-28-XXXX
CAS-No.: 107-21-1

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses: Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet

Company: Sigma-Aldrich Chemie GmbH
Riedstrasse 2
D-89555 STEINHEIM

Telephone: +49 89-6513-1444
Fax: +49 7329-97-2319
E-mail address: eurtechserv@sial.com

1.4 Emergency telephone number

Emergency Phone #
0800 181 7059 (CHEMTREC Deutschland)
+49 (0)696 43508409 (CHEMTREC weltweit)

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

Classification according to Regulation (EC) No 1272/2008
Acute toxicity, Oral (Category 4), H302
Specific target organ toxicity - repeated exposure, Oral (Category 2), Kidney, H373

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 Label elements

Labelling according Regulation (EC) No 1272/2008
Pictogram

Signal word: Warning

Hazard statement(s)
H302 Harmful if swallowed.
H373 May cause damage to organs (Kidney) through prolonged or repeated exposure if swallowed.
Precautionary statement(s)
P260 Do not breathe dust/ fume/ gas/ mist/ vapours/ spray.
P301 + P312 + P330 IF SWALLOWED: Call a POISON CENTER/doctor if you feel unwell. Rinse mouth.

Supplemental Hazard Statements

2.3 Other hazards
This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

SECTION 3: Composition/information on ingredients

3.1 Substances

Synonyms : 1,2-Ethanediol

<table>
<thead>
<tr>
<th>Component</th>
<th>Classification</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethylene glycol</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CAS-No.</td>
<td>107-21-1</td>
<td>Acute Tox. 4; STOT RE 2;</td>
</tr>
<tr>
<td>EC-No.</td>
<td>203-473-3</td>
<td>H302, H373</td>
</tr>
<tr>
<td>Index-No.</td>
<td>603-027-00-1</td>
<td>&lt;= 100 %</td>
</tr>
<tr>
<td>Registration number</td>
<td>01-2119456816-28-XXXX</td>
<td></td>
</tr>
</tbody>
</table>

For the full text of the H-Statements mentioned in this Section, see Section 16.

SECTION 4: First aid measures

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available
SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
No data available

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
No data available

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
Use personal protective equipment. Avoid breathing vapours, mist or gas. Ensure adequate ventilation.
For personal protection see section 8.

6.2 Environmental precautions
Do not let product enter drains.

6.3 Methods and materials for containment and cleaning up
Soak up with inert absorbent material and dispose of as hazardous waste. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Store in cool place. Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.

Hygroscopic.

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Components with workplace control parameters

Derived No Effect Level (DNEL)

<table>
<thead>
<tr>
<th>Application Area</th>
<th>Exposure routes</th>
<th>Health effect</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Workers</td>
<td>Inhalation</td>
<td>Long-term local effects</td>
<td>35 mg/m³</td>
</tr>
<tr>
<td>Workers</td>
<td>Skin contact</td>
<td>Long-term systemic effects</td>
<td>106mg/kg BW/d</td>
</tr>
<tr>
<td>Consumers</td>
<td>Inhalation</td>
<td>Long-term local effects</td>
<td>7 mg/m³</td>
</tr>
<tr>
<td>Consumers</td>
<td>Skin contact</td>
<td>Long-term systemic effects</td>
<td>53mg/kg BW/d</td>
</tr>
</tbody>
</table>

Predicted No Effect Concentration (PNEC)

<table>
<thead>
<tr>
<th>Compartment</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soil</td>
<td>1.53 mg/kg</td>
</tr>
<tr>
<td>Marine water</td>
<td>1 mg/l</td>
</tr>
<tr>
<td>Fresh water</td>
<td>10 mg/l</td>
</tr>
<tr>
<td>-------------------</td>
<td>---------</td>
</tr>
<tr>
<td>Marine sediment</td>
<td>3.7 mg/kg</td>
</tr>
<tr>
<td>Fresh water sediment</td>
<td>37 mg/kg</td>
</tr>
<tr>
<td>Sewage treatment plant</td>
<td>199.5 mg/l</td>
</tr>
<tr>
<td>Aquatic intermittent release</td>
<td>10 mg/l</td>
</tr>
</tbody>
</table>

### 8.2 Exposure controls

#### Appropriate engineering controls

Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

#### Personal protective equipment

**Eye/face protection**

Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

**Skin protection**

Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove’s outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

The selected protective gloves have to satisfy the specifications of EU Directive 89/686/EEC and the standard EN 374 derived from it.

**Full contact**

Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested: Dermatril® (KCL 740 / Aldrich Z677272, Size M)

**Splash contact**

Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested: Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

**Body Protection**

Complete suit protecting against chemicals. The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

**Respiratory protection**

Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

**Control of environmental exposure**

Do not let product enter drains.

### SECTION 9: Physical and chemical properties

#### 9.1 Information on basic physical and chemical properties

- **Appearance**: Liquid
9.2 Other safety information

Relative vapour density 2.14 - (Air = 1.0)

SECTION 10: Stability and reactivity

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
No data available

10.5 Incompatible materials
Strong acids, Strong oxidizing agents, Strong bases, Aldehydes, Aluminum

10.6 Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Carbon oxides
In the event of fire: see section 5
SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - 4.700 mg/kg
LD50 Dermal - Rabbit - 10.626 mg/kg

Skin corrosion/irritation
Skin - Rabbit
Result: No skin irritation

Serious eye damage/eye irritation
Eyes - Rabbit
Result: Mild eye irritation - 24 h

Respiratory or skin sensitisation
No data available

Germ cell mutagenicity
No data available

Carcinogenicity
This product is or contains a component that is probably not carcinogenic based on its IARC, ACGIH, NTP, or EPA classification.

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

Reproductive toxicity
Laboratory experiments have shown teratogenic effects.

Overexposure may cause reproductive disorder(s) based on tests with laboratory animals.

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
Oral - May cause damage to organs through prolonged or repeated exposure. - Kidney

Aspiration hazard
No data available

Additional Information
RTECS: KW2975000
When ingested early symptoms mimic alcohol inebriation and are followed by nausea, vomiting, abdominal pain, weakness, muscle tenderness, respiratory failure, convulsions, cardiovascular collapse, pulmonary edema, hypocalcemic tetany, and severe metabolic acidosis. Without treatment, death may occur in 8 to 24 hours. Victims who survive the initial toxicity period usually develop renal failure along with brain and liver damage., Exposure to and/or consumption of alcohol may increase toxic effects.

Central nervous system - Irregularities - Based on Human Evidence

SECTION 12: Ecological information

12.1 Toxicity

Toxicity to fish
LC50 - Oncorhynchus mykiss (rainbow trout) - 18.500 mg/l - 96 h
LC50 - Leuciscus idus (Golden orfe) - > 10.000 mg/l - 48 h
NOEC - Pimephales promelas (fathead minnow) - 32.000 mg/l - 7 d
NOEC - Pimephales promelas (fathead minnow) - 39.140 mg/l - 96 h

Toxicity to daphnia and
EC50 - Daphnia magna (Water flea) - 74.000 mg/l - 24 h
12.2 **Persistence and degradability**
No data available

| Ratio BOD/ThBOD | 0.78 % |

12.3 **Bioaccumulative potential**
Does not bioaccumulate.

<table>
<thead>
<tr>
<th>Bioaccumulation</th>
<th>other fish - 61 d - 50 mg/l</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Bioconcentration factor (BCF): 0.60</td>
</tr>
</tbody>
</table>

12.4 **Mobility in soil**
No data available

12.5 **Results of PBT and vPvB assessment**
This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

12.6 **Other adverse effects**
No data available

### SECTION 13: Disposal considerations

13.1 **Waste treatment methods**

**Product**
Offer surplus and non-recyclable solutions to a licensed disposal company.

**Contaminated packaging**
Dispose of as unused product.

### SECTION 14: Transport information

14.1 **UN number**

| ADR/RID: - | IMDG: - | IATA: - |

14.2 **UN proper shipping name**

<table>
<thead>
<tr>
<th>ADR/RID:</th>
<th>IMDG: Not dangerous goods</th>
</tr>
</thead>
<tbody>
<tr>
<td>IMDG:</td>
<td>Not dangerous goods</td>
</tr>
<tr>
<td>IATA:</td>
<td>Not dangerous goods</td>
</tr>
</tbody>
</table>

14.3 **Transport hazard class(es)**

| ADR/RID: - | IMDG: - | IATA: - |

14.4 **Packaging group**

| ADR/RID: - | IMDG: - | IATA: - |

14.5 **Environmental hazards**

| ADR/RID: no | IMDG Marine pollutant: no | IATA: no |

14.6 **Special precautions for user**
No data available

### SECTION 15: Regulatory information

15.1 **Safety, health and environmental regulations/legislation specific for the substance or mixture**
This safety datasheet complies with the requirements of Regulation (EC) No. 1907/2006.
15.2  Chemical safety assessment
A Chemical Safety Assessment has been carried out for this substance.

SECTION 16: Other information

Full text of H-Statements referred to under sections 2 and 3.

H302  Harmful if swallowed.
H373  May cause damage to organs through prolonged or repeated exposure if swallowed.

Further information
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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.
SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers
   Product name: Sodium dodecyl sulfate
   Product Number: L3771
   Brand: Sigma
   REACH No.: A registration number is not available for this substance as the substance or its uses are exempted from registration, the annual tonnage does not require a registration or the registration is envisaged for a later registration deadline.
   CAS-No.: 151-21-3

1.2 Relevant identified uses of the substance or mixture and uses advised against
   Identified uses: Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet
   Company: Sigma-Aldrich Chemie GmbH
   Riedstrasse 2
   D-89555 STEINHEIM
   Telephone: +49 89-6513-1444
   Fax: +49 7329-97-2319
   E-mail address: eurtechserv@sial.com

1.4 Emergency telephone number
   Emergency Phone #: 0800 181 7059 (CHEMTREC Deutschland)
   +49 (0)696 43508409 (CHEMTREC weltweit)

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture
   Classification according to Regulation (EC) No 1272/2008
   Flammable solids (Category 2), H228
   Acute toxicity, Oral (Category 4), H302
   Acute toxicity, Inhalation (Category 4), H332
   Skin irritation (Category 2), H315
   Serious eye damage (Category 1), H318
   Specific target organ toxicity - single exposure (Category 3), Respiratory system, H335
   Chronic aquatic toxicity (Category 3), H412

   For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 Label elements
   Labelling according Regulation (EC) No 1272/2008
   Pictogram

   Signal word: Danger
2.3 Other hazards

This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

Possible sensitizer.

SECTION 3: Composition/information on ingredients

3.1 Substances

Synonyms: Lauryl sulfate sodium salt
          Sodium dodecyl sulphate
          Sodium dodecyl sulfate
          Sodium lauryl sulfate
          Dodecyl sodium sulfate
          Dodecyl sulfate sodium salt
          SDS

Formula: C_{12}H_{25}NaO_{4}S

Molecular weight: 288.38 g/mol

CAS-No.: 151-21-3

EC-No.: 205-788-1

Hazardous ingredients according to Regulation (EC) No 1272/2008

<table>
<thead>
<tr>
<th>Component</th>
<th>Classification</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sodium dodecyl sulphate</td>
<td>Flam. Sol. 2; Acute Tox. 4; Skin Irrit. 2; Eye Dam. 1; STOT SE 3; Aquatic Chronic 3; H228, H302, H332, H315, H318, H335, H412</td>
<td>&lt;= 100 %</td>
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<tr>
<td>CAS-No.</td>
<td>151-21-3</td>
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<tr>
<td>EC-No.</td>
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</tbody>
</table>

For the full text of the H-Statements mentioned in this Section, see Section 16.
SECTION 4: First aid measures

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If swallowed
Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
No data available

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
Use water spray to cool unopened containers.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
Use personal protective equipment. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Avoid breathing dust.
For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up
Sweep up and shovel. Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations (see section 13). Keep in suitable, closed containers for disposal. Contain spillage, pick up with an electrically protected vacuum cleaner or by wet-brushing and transfer to a container for disposal according to local regulations (see section 13).

6.4 Reference to other sections
For disposal see section 13.
SECTION 7: Handling and storage

7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid formation of dust and aerosols. Provide appropriate exhaust ventilation at places where dust is formed. Keep away from sources of ignition. No smoking. Take measures to prevent the build up of electrostatic charge. For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Store in cool place. Keep container tightly closed in a dry and well-ventilated place.

   hygroscopic
   Storage class (TRGS 510): Flammable solid hazardous materials

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

SECTION 8: Exposure controls/personal protection

8.1 Control parameters
Components with workplace control parameters

8.2 Exposure controls
Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

   Eye/face protection
   Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

   Skin protection
   Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove’s outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

The selected protective gloves have to satisfy the specifications of EU Directive 89/686/EEC and the standard EN 374 derived from it.

   Full contact
   Material: Nitrile rubber
   Minimum layer thickness: 0.11 mm
   Break through time: 480 min
   Material tested: Dermatril® (KCL 740 / Aldrich Z677272, Size M)

   Splash contact
   Material: Nitrile rubber
   Minimum layer thickness: 0.11 mm
   Break through time: 480 min
   Material tested: Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de,
test method: EN374

If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.
Body Protection
Complete suit protecting against chemicals, Flame retardant antistatic protective clothing. The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a) Appearance
   Form: Rods
   Colour: white

b) Odour
   odourless

c) Odour Threshold
   No data available

d) pH
   9,1 at 10 g/l

e) Melting point/freezing point
   Melting point/range: 204 - 207 °C - lit.

f) Initial boiling point and boiling range
   No data available

g) Flash point
   170 °C

h) Evaporation rate
   No data available

i) Flammability (solid, gas)
   The substance or mixture is a flammable solid with the category 2.

j) Upper/lower flammability or explosive limits
   No data available

k) Vapour pressure
   0,0018 hPa at 20 °C

l) Vapour density
   No data available

m) Relative density
   0,370 g/cm3

n) Water solubility
   soluble

o) Partition coefficient: n-octanol/water
   log Pow: 0,83 at 22 °C

p) Auto-ignition temperature
   310,5 °C

q) Decomposition temperature
   No data available

r) Viscosity
   No data available

s) Explosive properties
   No data available

t) Oxidizing properties
   No data available

9.2 Other safety information

Solubility in other solvents
   Ethanol - partly soluble
SECTION 10: Stability and reactivity

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
Heat, flames and sparks.

10.5 Incompatible materials
Oxidizing agents

10.6 Hazardous decomposition products
Other decomposition products - No data available
Hazardous decomposition products formed under fire conditions. - Carbon oxides, Sulphur oxides, Sodium oxides
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - male and female - 1.200 mg/kg
LC50 Inhalation - Rat - 1 h - > 3.900 mg/m3

Skin corrosion/irritation
Skin - Rabbit
Result: Skin irritation - 24 h
(OECD Test Guideline 404)

Serious eye damage/eye irritation
Eyes - Rabbit
Result: Risk of serious damage to eyes.
(OECD Test Guideline 405)

Respiratory or skin sensitisation
Information given is based on data obtained from similar substances.

Germ cell mutagenicity
No data available

Ames test
S. typhimurium
Result: negative

Carcinogenicity
IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

Reproductive toxicity
No data available

Specific target organ toxicity - single exposure
No data available

Surface tension 25.2 mN/m at 23 °C
Dissociation constant 1.31 at 20 °C
**Specific target organ toxicity - repeated exposure**
No data available

**Aspiration hazard**
No data available

**Additional Information**
RTECS: WT1050000
sneezing, The sodium salt of dodecyl sulfate has been reported to cause pulmonary sensitization resulting in hyperactive airway dysfunction and pulmonary allergy accompanied by fatigue, malaise, and aching. Significant symptoms of exposure can persist for more than two years and can be activated by a variety of nonspecific environmental stimuli such as automobile exhaust, perfumes, and passive smoking. To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

---

**SECTION 12: Ecological information**

12.1 **Toxicity**

<table>
<thead>
<tr>
<th>Toxicity to fish</th>
<th>flow-through test LC50 - Pimephales promelas (fathead minnow) - 29 mg/l - 96 h (OECD Test Guideline 203)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Toxicity to daphnia and other aquatic invertebrates</td>
<td>LC50 - Daphnia dubia (water flea) - 5,55 mg/l - 48 h</td>
</tr>
<tr>
<td>Toxicity to algae</td>
<td>NOEC - Daphnia dubia (water flea) - 0,684 mg/l - 7 d</td>
</tr>
<tr>
<td>Growth inhibition LOEC - Pseudokirchneriella subcapitata - 2,68 mg/l - 6 d</td>
<td></td>
</tr>
<tr>
<td>Static test EC50 - Desmodesmus subspicatus (Scenedesmus subspicatus) - &gt; 120 mg/l - 72 h</td>
<td></td>
</tr>
</tbody>
</table>

12.2 **Persistence and degradability**

<table>
<thead>
<tr>
<th>Biodegradability</th>
<th>aerobic - Exposure time 28 d</th>
</tr>
</thead>
<tbody>
<tr>
<td>Result: 95 % - Readily biodegradable</td>
<td>(OECD Test Guideline 301B)</td>
</tr>
<tr>
<td>Ratio BOD/ThBOD</td>
<td>95,9 %</td>
</tr>
</tbody>
</table>

12.3 **Bioaccumulative potential**

<table>
<thead>
<tr>
<th>Bioaccumulation</th>
<th>Cyprinus carpio (Carp) - 72 h</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bioconcentration factor (BCF):</td>
<td>3,9 - 5,3</td>
</tr>
</tbody>
</table>

12.4 **Mobility in soil**
No data available

12.5 **Results of PBT and vPvB assessment**
This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

12.6 **Other adverse effects**
Toxic to aquatic life.

---

**SECTION 13: Disposal considerations**

13.1 **Waste treatment methods**

| Product | Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Offer surplus and non-recyclable solutions to a licensed disposal company. |
Contaminated packaging
Dispose of as unused product.

SECTION 14: Transport information

14.1 UN number
ADR/RID: 1325
IMDG: 1325
IATA: 1325

14.2 UN proper shipping name
ADR/RID: FLAMMABLE SOLID, ORGANIC, N.O.S. (Sodium dodecyl sulphate)
IMDG: FLAMMABLE SOLID, ORGANIC, N.O.S. (Sodium dodecyl sulphate)
IATA: Flammable solid, organic, n.o.s. (Sodium dodecyl sulphate)

14.3 Transport hazard class(es)
ADR/RID: 4.1
IMDG: 4.1
IATA: 4.1

14.4 Packaging group
ADR/RID: III
IMDG: III
IATA: III

14.5 Environmental hazards
ADR/RID: no
IMDG Marine pollutant: no
IATA: no

14.6 Special precautions for user
No data available

SECTION 15: Regulatory information

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture
This safety datasheet complies with the requirements of Regulation (EC) No. 1907/2006.

15.2 Chemical safety assessment
For this product a chemical safety assessment was not carried out

SECTION 16: Other information

Full text of H-Statements referred to under sections 2 and 3.
H228 Flammable solid.
H302 Harmful if swallowed.
H302 + H332 Harmful if swallowed or if inhaled
H315 Causes skin irritation.
H318 Causes serious eye damage.
H319 Causes serious eye irritation.
H332 Harmful if inhaled.
H335 May cause respiratory irritation.
H412 Harmful to aquatic life with long lasting effects.

Further information
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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.
SAFETY DATA SHEET

1. IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING

1.1 Product identifier

Product name: Lomar® PW
Product code: 6287
Synonyms: Sulfonated Naphthalene Condensate, Sodium Salt

1.2 Relevant identified uses of the substance or mixture and uses advised against

Recommended use [RU]: No information available
Uses advised against: None known

1.3 Details of the supplier of the safety data sheet

Supplier: GEO Specialty Chemicals, Inc.
701 Wissahickon Avenue
Cedartown, GA 30125
+1-770-748-1200
Hours: Monday-Friday 9:00-5:00 EST (Eastern Standard Time)

Only representative: GEO Specialty Chemicals UK Ltd
Charleston Road, Hardley, Hythe
Southampton, Hampshire SO45 3ZG
United Kingdom
Phone: +44 (0)23 80894666
Fax No: +44 (0)23 80243113

Responsibility Statement: For further information, please contact safety-data-sheet-fp@geosc.com

1.4 Emergency telephone number

Emergency telephone: 24 Hour Emergency Phone Number
GEO Specialty Chemicals UK Ltd
+44 (0)23 80891806

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

Classification according to Regulation (EC) No. 1272/2008 [CLP]

This mixture is classified as not hazardous according to regulation (EC) 1272/2008 [GHS].

2.2 Label elements

Labeling according to Regulation (EC) No. 1272/2008 [CLP]

Signal word: Not classified
Hazard statements: None
Precautionary statements

None

2.3 Other Information

None known

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Not applicable

3.2 Mixtures

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Naphthalenesulfonic acid, formaldehyde polymer, sodium salt 9084-06-4</td>
<td>Not applicable</td>
<td>&gt; 80%</td>
<td>Not Classified as Hazardous</td>
<td>In compliance</td>
</tr>
<tr>
<td>Sodium Sulfate 7757-82-6</td>
<td>231-820-9</td>
<td>&lt; 10%</td>
<td>Not Classified as Hazardous</td>
<td>In compliance</td>
</tr>
<tr>
<td>Water 7732-18-5</td>
<td>231-791-2</td>
<td>&lt; 10%</td>
<td>Not Classified as Hazardous</td>
<td>In compliance</td>
</tr>
</tbody>
</table>

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

Eye contact
Remove contact lenses, if worn. Immediately flush with plenty of water for at least 15 minutes, holding eyelids apart to ensure flushing of the entire surface. Washing within one minute is essential to achieve maximum effectiveness. If eye irritation persists: Get medical advice/attention.

Skin contact
Immediately flush skin with plenty of soap and water for at least 15 minutes. Remove contaminated clothing and shoes. Wash contaminated clothing before reuse. If skin irritation occurs: Get medical advice/attention.

Ingestion
Do NOT induce vomiting. If vomiting should occur spontaneously, keep airway clear. Never give anything by mouth to an unconscious person. Get medical attention.

Inhalation
Remove to fresh air. If not breathing give artificial respiration. If breathing is difficult, give oxygen. Call a physician.

4.2 Most important symptoms and effects, both acute and delayed

Most important symptoms and effects
No information available.

Aggravated Medical Conditions
Existing skin, eye and lung conditions.

4.3 Indication of any immediate medical attention and special treatment needed

Note to physicians
Treat symptomatically.
5. FIRE-FIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media
Water mist. Carbon dioxide (CO2). Foam. Dry chemical.

Extinguishing media which must not be used for safety reasons
No information available.

5.2 Special hazards arising from the substance or mixture

Special Hazard
Use water spray to cool fire exposed surfaces.

5.3 Advice for firefighters

Special protective equipment for firefighters
Firefighters should wear self-contained breathing apparatus and full firefighting turnout gear.

Firefighting measures
Cool exposed containers with water spray after extinguishing fire.

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures

Personal precautions
Wear suitable protective clothing and gloves.

6.2 Environmental precautions

Environmental precautions
Do not permit run-off to get into sewers or surface waterways.

6.3 Methods and material for containment and cleaning up

Methods for cleaning up
Stop leaks. Clear spills immediately. Shovel into labeled waste container for reuse or disposal. Do not use vacuum truck because of corrosive nature of product. Avoid generating dust; fine dust dispersed in air in sufficient concentrations, and in the presence of an ignition source is a potential dust explosion hazard. Provide adequate ventilation to spill area.

6.4 Reference to other sections

See Section 12 for additional Ecological Information

7. HANDLING AND STORAGE

7.1 Precautions for safe handling

Advice on safe handling
Hygroscopic
Keep container closed when not in use
Avoid contact with eyes, skin and clothing
Personal protective equipment comprising: suitable protective gloves, safety goggles and protective clothing.
Wash thoroughly after handling
Avoid creating dust. Avoid breathing dust. Use only with adequate ventilation. Use respiratory protection where dust may be generated.

FOR INDUSTRIAL USE ONLY.

7.2 Conditions for safe storage, including any incompatibilities
Technical measures and storage conditions
Store in a cool, dry place to prevent product from caking

7.3 Specific end use(s)
Specific use(s)
Not applicable

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Occupational exposure limit value

<table>
<thead>
<tr>
<th>Component</th>
<th>European Union</th>
<th>United Kingdom</th>
<th>Spain</th>
<th>Germany</th>
<th>Turkey</th>
</tr>
</thead>
<tbody>
<tr>
<td>Naphthalenesulfonic acid, formaldehyde polymer, sodium salt 9084-06-4</td>
<td>NAV</td>
<td>NAV</td>
<td>NAV</td>
<td>NAV</td>
<td>NAV</td>
</tr>
<tr>
<td>Sodium Sulfate 7757-82-6</td>
<td>NAV</td>
<td>NAV</td>
<td>NAV</td>
<td>NAV</td>
<td>NAV</td>
</tr>
</tbody>
</table>

Biological limit values

<table>
<thead>
<tr>
<th>Component</th>
<th>European Union</th>
<th>United Kingdom</th>
<th>Spain</th>
<th>Germany</th>
<th>Turkey</th>
</tr>
</thead>
<tbody>
<tr>
<td>Naphthalenesulfonic acid, formaldehyde polymer, sodium salt 9084-06-4</td>
<td>NAV</td>
<td>NAV</td>
<td>NAV</td>
<td>NAV</td>
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</tr>
<tr>
<td>Sodium Sulfate 7757-82-6</td>
<td>NAV</td>
<td>NAV</td>
<td>NAV</td>
<td>NAV</td>
<td>NAV</td>
</tr>
</tbody>
</table>

Legend
NAV - Not available

8.2 Exposure controls

Personal Protective Equipment

Eye/face Protection
Dust protection eye glasses.

Hand Protection
Appropriate chemical resistant gloves should be worn.

Skin and body protection
Wear suitable protective clothing.

Respiratory protection
NIOSH/MSHA approved respirator if necessary. Follow manufacturer’s recommendations.

Other personal protection data
Eyewash fountains and safety showers must be easily accessible.

Hygiene measures
Handle in accordance with good industrial hygiene and safety practice.

Environmental exposure controls
No information available.
9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

<table>
<thead>
<tr>
<th>Property</th>
<th>Values</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical state</td>
<td>solid</td>
<td></td>
</tr>
<tr>
<td>Color</td>
<td>tan</td>
<td></td>
</tr>
<tr>
<td>Appearance</td>
<td>fine powder</td>
<td></td>
</tr>
<tr>
<td>Odor</td>
<td>bland</td>
<td></td>
</tr>
<tr>
<td>Odor threshold</td>
<td>No information available</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Property</th>
<th>Values</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>pH</td>
<td>9.0 - 10.5</td>
<td>solution (10 %)</td>
</tr>
<tr>
<td>Melting / freezing point</td>
<td>No information available</td>
<td></td>
</tr>
<tr>
<td>Boiling point / boiling range</td>
<td>No information available</td>
<td></td>
</tr>
<tr>
<td>Flash point</td>
<td>No information available</td>
<td></td>
</tr>
<tr>
<td>Evaporation rate</td>
<td>No information available</td>
<td></td>
</tr>
<tr>
<td>Flammability (solid, gas)</td>
<td>No information available</td>
<td></td>
</tr>
<tr>
<td>Flammability Limit in Air</td>
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<td></td>
</tr>
<tr>
<td>Upper flammability limit</td>
<td>No information available</td>
<td></td>
</tr>
<tr>
<td>Lower flammability limit</td>
<td>No information available</td>
<td></td>
</tr>
<tr>
<td>Vapor pressure</td>
<td>No information available</td>
<td></td>
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<tr>
<td>Vapor density</td>
<td>No information available</td>
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<tr>
<td>Specific gravity</td>
<td>0.60</td>
<td>No information available</td>
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<tr>
<td>Solubility (water)</td>
<td>clear</td>
<td>solution (20 %)</td>
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<tr>
<td>Solubility in other solvents</td>
<td>No information available</td>
<td></td>
</tr>
<tr>
<td>Partition coefficient: n-octanol/water</td>
<td>No information available</td>
<td></td>
</tr>
<tr>
<td>Autoignition temperature</td>
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<td></td>
</tr>
<tr>
<td>Decomposition temperature</td>
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<td></td>
</tr>
<tr>
<td>Kinematic viscosity</td>
<td>Not applicable</td>
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</tr>
<tr>
<td>Dynamic viscosity</td>
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<td>No information available</td>
</tr>
<tr>
<td>Density</td>
<td>5.5 lb/gal</td>
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</tr>
</tbody>
</table>

9.2 Other information

<table>
<thead>
<tr>
<th>Property</th>
<th>Values</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bulk Density</td>
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<td></td>
</tr>
<tr>
<td>Explosive properties</td>
<td>No information available</td>
<td></td>
</tr>
<tr>
<td>Oxidizing properties</td>
<td>No information available</td>
<td></td>
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<tr>
<td>Softening point</td>
<td>No information available</td>
<td></td>
</tr>
<tr>
<td>Molecular weight</td>
<td>3,000 max</td>
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<tr>
<td>Volatile Organic Compound (VOC) content, wt.%</td>
<td>No information available</td>
<td></td>
</tr>
<tr>
<td>Percent Volatile, wt.%</td>
<td>5.0 % max w/w</td>
<td></td>
</tr>
</tbody>
</table>
10. STABILITY AND REACTIVITY

10.1 Reactivity

Reactivity
No information available.

10.2 Chemical stability

Chemical stability
Stable under normal conditions.

10.3 Possibility of hazardous reactions

Hazardous polymerization
Not anticipated under normal or recommended handling and storage conditions.

10.4 Conditions to avoid

Conditions to avoid
None.

10.5 Incompatible materials

Materials to avoid
Oxidizing agents.

10.6 Hazardous decomposition products

Hazardous decomposition products
Carbon oxides. Sulphur oxides.

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute health hazard

Eye contact
May cause mild, transient eye irritation.

Skin contact
Possible mild, transient skin irritation on prolonged contact.

Ingestion
May be harmful if swallowed.

Inhalation
Not considered hazardous under normal conditions of use. Inhalation of dust may cause irritation of the respiratory system.

Acute toxicity - Product Information

Oral LD50  
> 2,000 mg/kg

Dermal LD50
No information available

Inhalation LC50
No information available

Acute toxicity - Component Information
### Component Toxicity

<table>
<thead>
<tr>
<th>Component</th>
<th>Oral LD50</th>
<th>Dermal LD50</th>
<th>Inhalation LC50</th>
</tr>
</thead>
<tbody>
<tr>
<td>Naphthalenesulfonic acid, formaldehyde polymer, sodium salt 9084-06-4 ( &gt; 80% )</td>
<td>= 3800 mg/kg ( Rat )</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Sodium Sulfate 7757-82-6 ( &lt; 10% )</td>
<td>&gt; 10000 mg/kg ( Rat )</td>
<td>--</td>
<td>--</td>
</tr>
</tbody>
</table>

**Skin corrosion/irritation**
- Mild skin irritation

**Serious eye damage/eye irritation**
- Mild eye irritation

**Sensitization**
- No information available

**Germ cell mutagenicity**
- No information available

**Carcinogenicity**
- No information available

**Reproductive toxicity**
- No information available

** Specific target organ toxicity - Single exposure**
- No information available.

** Specific target organ toxicity - Repeated exposure**
- No information available

**Aspiration hazard**
- No information available

### 12. ECOLOGICAL INFORMATION

#### 12.1 Toxicity

**Acute aquatic toxicity - Product Information**

- Fish: No information available
- Crustacea: No information available
- Algae/aquatic plants: No information available

**Acute aquatic toxicity - Component Information**

<table>
<thead>
<tr>
<th>Component</th>
<th>Algae/aquatic plants</th>
<th>Fish</th>
<th>Toxicity to daphnia and other aquatic invertebrates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sodium Sulfate 7757-82-6 ( &lt; 10% )</td>
<td>--</td>
<td>LC50 (96 h ) = 13500 - 14500 mg/L (Pimephales promelas) LC50 (96 h ) = 13500 mg/L (Lepomis macrochirus) LC50 (96 h static ) = 3040 - 4380 mg/L (Lepomis macrochirus) LC50 (96 h static ) &gt; 6800 mg/L (Pimephales promelas) EC50 (96 h ) = 630 mg/L (Daphnia magna) EC50 (48 h ) = 2564 mg/L (Daphnia magna)</td>
<td></td>
</tr>
</tbody>
</table>

#### 12.2 Persistence and degradability
Persistence and degradability
No information available

12.3 Bioaccumulative potential

Bioaccumulative potential
No information available

12.4 Mobility in soil

Mobility
No information available

12.5 Results of PBT and vPvB assessment

PBT and vPvB assessment
No information available

12.6 Other adverse effects

Other information
No other ecological studies have been carried out on this product.

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Disposal of wastes
Do not put solutions containing this product into sewer systems. Dispose of according to regulations.

Contaminated packaging
Since empty containers retain product residue, follow label warnings even after container is emptied.

14. TRANSPORT INFORMATION

US DOT Not regulated
14.1. UN number
14.2. UN proper shipping name
14.3. Transport hazard class(es)
14.4. Packing group
14.5. Environmental hazards
14.6. Special precautions for user

Land transport (ADR/RID) Not regulated
14.1. UN number
14.2. UN proper shipping name
14.3. Transport hazard class(es)
14.4. Packing group
14.5. Environmental hazards
14.6. Special precautions for user

Inland waterway transport (ADN) Not regulated
14.1. UN number
14.2. UN proper shipping name
14.3. Transport hazard class(es)
14.4. Packing group
14.5. Environmental hazards
14.6. Special precautions for user
Air transport (ICAO-TI / IATA-DGR) Not regulated  
14.1. UN number 
14.2. UN proper shipping name 
14.3. Transport hazard class(es) 
14.4. Packing group 
14.5. Environmental hazards 
14.6. Special precautions for user 

Sea transport (IMDG) Not regulated 
14.1. UN number 
14.2. UN proper shipping name 
14.3. Transport hazard class(es) 
14.4. Packing group 
14.5. Environmental hazards 
14.6. Special precautions for user 

14.7 Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code 
Not applicable

Harmonized Tariff Number 3911.90

15. REGULATORY INFORMATION

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture

International Inventories

Australia (AICS) 
All ingredients are on the inventory or exempt from listing 

Canada (DSL) 
All ingredients are on the inventory or exempt from listing

Canada (NDSL) 
None of the ingredients are on the inventory.

China (IECSC) 
All ingredients are on the inventory or exempt from listing

EINECS (European Inventory of Existing Chemical Substances) 
All ingredients are on the inventory or exempt from listing

ELINCS (European List of Notified Chemical Substances) 
None of the ingredients are on the inventory.

ENCs (Japan) 
All ingredients are on the inventory or exempt from listing

South Korea (KECL) 
All ingredients are on the inventory or exempt from listing

Philippines (PICCS) 
All ingredients are on the inventory or exempt from listing

TSCA (United States) 
All ingredients are on the inventory or exempt from listing

Legend
AICS - Australian Inventory of Chemical Substances
DSL/NDSL - Canadian Domestic Substances List/Non-Domestic Substances List
IECSC - China Inventory of Existing Chemical Substances
EINECS/ELINCS - European Inventory of Existing Commercial Chemical Substances/EU List of Notified Chemical Substances
ENCs - Japan Existing and New Chemical Substances
KECL - Korean Existing and Evaluated Chemical Substances  
PICCS - Philippines Inventory of Chemicals and Chemical Substances  
TSCA - United States Toxic Substances Control Act Section 8(b) Inventory  

15.2 Chemical Safety Report

No information available.

### 16. OTHER INFORMATION

<table>
<thead>
<tr>
<th>Product code</th>
<th>6287</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revision date</td>
<td>2016-12-13</td>
</tr>
</tbody>
</table>

**Full text of H-Statements referred to under sections 2 and 3**

None

**Key or legend to abbreviations and acronyms used in the safety data sheet**

NAV - Not available

**This safety data sheet complies with the requirements of**: Regulation (EC) No. 1907/2006.

**Additional information**

None

**Disclaimer**

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.
1. IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING

1.1 Product identifiers
   Product name: Sodium 2-naphthalenesulfonate
   
   Product Number: 109673
   Brand: Aldrich
   CAS-No.: 532-02-5

1.2 Relevant identified uses of the substance or mixture and uses advised against
   Identified uses: Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet
   Company: Sigma-Aldrich Chemie GmbH
   Riedstrasse 2
   D-89555 STEINHEIM
   
   Telephone: +49 89-6513-1444
   Fax: +49 7329-97-2319
   E-mail address: eurtechserv@sial.com

1.4 Emergency telephone number
   Emergency Phone #: 0800 181 7059 (CHEMTREC Deutschland)
   +49 (0)696 43508409 (CHEMTREC weltweit)

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture
   Classification according to Regulation (EC) No 1272/2008 [EU-GHS/CLP]
   Skin irritation (Category 2)
   Eye irritation (Category 2)
   Specific target organ toxicity - single exposure (Category 3)

   Classification according to EU Directives 67/548/EEC or 1999/45/EC
   Irritating to eyes, respiratory system and skin.

2.2 Label elements
   Labelling according Regulation (EC) No 1272/2008 [CLP]
   Pictogram

   Signal word: Warning

   Hazard statement(s)
   H315
   H319
   H335

   Precautionary statement(s)
   P261
   P305 + P351 + P338

   Supplemental Hazard Statements
   none

Hazard symbol(s) □

R-phrase(s)
R36/37/38 Irritating to eyes, respiratory system and skin.

S-phrase(s)
S26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
S36 Wear suitable protective clothing.

2.3 Other hazards - none

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances
Formula : C10H7NaO3S
Molecular Weight : 230,22 g/mol

<table>
<thead>
<tr>
<th>Component</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sodium naphthalene-2-sulphonate</td>
<td>-</td>
</tr>
<tr>
<td>CAS-No.</td>
<td>532-02-5</td>
</tr>
<tr>
<td>EC-No.</td>
<td>208-523-8</td>
</tr>
</tbody>
</table>

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

4.3 Indication of any immediate medical attention and special treatment needed
No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
Carbon oxides, Sulphur oxides, Sodium oxides

5.3 Advice for firefighters
Wear self contained breathing apparatus for fire fighting if necessary.

5.4 Further information
No data available
6. **ACCIDENTAL RELEASE MEASURES**

6.1 **Personal precautions, protective equipment and emergency procedures**
Use personal protective equipment. Avoid dust formation. Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust.

6.2 **Environmental precautions**
Do not let product enter drains.

6.3 **Methods and materials for containment and cleaning up**
Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

6.4 **Reference to other sections**
For disposal see section 13.

7. **HANDLING AND STORAGE**

7.1 **Precautions for safe handling**
Avoid contact with skin and eyes. Avoid formation of dust and aerosols. Provide appropriate exhaust ventilation at places where dust is formed.

7.2 **Conditions for safe storage, including any incompatibilities**
Store in cool place. Keep container tightly closed in a dry and well-ventilated place.

Hygroscopic.

7.3 **Specific end use(s)**
no data available

8. **EXPOSURE CONTROLS/PERSONAL PROTECTION**

8.1 **Control parameters**

Components with workplace control parameters

8.2 **Exposure controls**

**Appropriate engineering controls**
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

**Personal protective equipment**

**Eye/face protection**
Safety glasses with side-shields conforming to EN166 Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

**Skin protection**
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove’s outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

The selected protective gloves have to satisfy the specifications of EU Directive 89/686/EEC and the standard EN 374 derived from it.

**Full contact**
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

**Splash protection**
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)
data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an Industrial Hygienist familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

**Body Protection**
impervious clothing, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

**Respiratory protection**
For nuisance exposures use type P95 (US) or type P1 (EU EN 143) particle respirator. For higher level protection use type OV/AG/P99 (US) or type ABEK-P2 (EU EN 143) respirator cartridges. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

9. **PHYSICAL AND CHEMICAL PROPERTIES**

9.1 **Information on basic physical and chemical properties**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
</table>
| a) Appearance | Form: powder  
Colour: white |
| b) Odour | no data available |
| c) Odour Threshold | no data available |
| d) pH | no data available |
| e) Melting point/freezing point | no data available |
| f) Initial boiling point and boiling range | no data available |
| g) Flash point | no data available |
| h) Evaporation rate | no data available |
| i) Flammability (solid, gas) | no data available |
| j) Upper/lower flammability or explosive limits | no data available |
| k) Vapour pressure | no data available |
| l) Vapour density | no data available |
| m) Relative density | no data available |
| n) Water solubility | no data available |
| o) Partition coefficient: n-octanol/water | no data available |
| p) Auto-ignition temperature | no data available |
| q) Decomposition temperature | no data available |
| r) Viscosity | no data available |
| s) Explosive properties | no data available |
| t) Oxidizing properties | no data available |

9.2 **Other safety information**
no data available
10. STABILITY AND REACTIVITY

10.1 Reactivity
no data available

10.2 Chemical stability
no data available

10.3 Possibility of hazardous reactions
no data available

10.4 Conditions to avoid
no data available

10.5 Incompatible materials
Strong oxidizing agents

10.6 Hazardous decomposition products
Other decomposition products - no data available

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - rat - 13.900 mg/kg

Skin corrosion/irritation
no data available

Serious eye damage/eye irritation
no data available

Respiratory or skin sensitization
no data available

Germ cell mutagenicity
no data available

Carcinogenicity
IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

Reproductive toxicity
no data available

Specific target organ toxicity - single exposure
Inhalation - May cause respiratory irritation.

Specific target organ toxicity - repeated exposure
no data available

Aspiration hazard
no data available

Potential health effects

Inhalation May be harmful if inhaled. Causes respiratory tract irritation.

Ingestion May be harmful if swallowed.

Skin May be harmful if absorbed through skin. Causes skin irritation.

Eyes Causes serious eye irritation.

Signs and Symptoms of Exposure
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Additional Information
RTECS: QK36780000
12. ECOLOGICAL INFORMATION

12.1 Toxicity
Toxicity to daphnia and other aquatic invertebrates
LC50 - Daphnia magna (Water flea) - 135 mg/l - 4.2 d

12.2 Persistence and degradability
no data available

12.3 Bioaccumulative potential
no data available

12.4 Mobility in soil
no data available

12.5 Results of PBT and vPvB assessment
no data available

12.6 Other adverse effects
no data available

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product
Offer surplus and non-recyclable solutions to a licensed disposal company. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

14.1 UN number
ADR/RID: - IMDG: - IATA: -

14.2 UN proper shipping name
ADR/RID: Not dangerous goods IMDG: Not dangerous goods IATA: Not dangerous goods

14.3 Transport hazard class(es)
ADR/RID: - IMDG: - IATA: -

14.4 Packaging group
ADR/RID: - IMDG: - IATA: -

14.5 Environmental hazards
ADR/RID: no IMDG Marine Pollutant: no IATA: no

14.6 Special precautions for user
no data available

15. REGULATORY INFORMATION

This safety datasheet complies with the requirements of Regulation (EC) No. 1907/2006.

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture
no data available

15.2 Chemical Safety Assessment
no data available
16. OTHER INFORMATION

Further information
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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.
SAFETY DATA SHEET
according to Regulation (EC) No. 1907/2006

Revision Date 02.06.2017  Version 28.3

SECTION 1. Identification of the substance/mixture and of the company/undertaking

1.1 Product Identifier

Catalogue No. 102445
Product name Chloroform for analysis EMSURE® ACS,ISO,Reag. Ph Eur

REACH Registration Number 01-2119486657-20-XXXX
CAS-No. 67-66-3

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses Reagent for analysis, Chemical production
In compliance with the conditions described in the annex to this safety data sheet.

1.3 Details of the supplier of the safety data sheet

Company Merck KGaA * 64271 Darmstadt * Germany * Phone:+49 6151 72-0
Responsible Department LS-QHC * e-mail: prodsafe@merckgroup.com

1.4 Emergency telephone number
Please contact the regional company representation in your country.

SECTION 2. Hazards Identification

2.1 Classification of the substance or mixture
Classification (REGULATION (EC) No 1272/2008)
SAFETY DATA SHEET

according to Regulation (EC) No. 1907/2006

Catalogue No. 102445
Product name Chloroform for analysis EMSURE® ACS,ISO,Reag. Ph Eur

Acute toxicity, Category 4, Oral, H302
Acute toxicity, Category 3, Inhalation, H331
Skin irritation, Category 2, H315
Eye irritation, Category 2, H319
Carcinogenicity, Category 2, H351
Reproductive toxicity, Category 2, H361d
Specific target organ toxicity - repeated exposure, Category 1, Liver, Kidney, H372

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 Label elements

Labelling (REGULATION (EC) No 1272/2008)

Hazard pictograms

Signal word
Danger

Hazard statements
H302 Harmful if swallowed.
H315 Causes skin irritation.
H319 Causes serious eye irritation.
H331 Toxic if inhaled.
H351 Suspected of causing cancer.
H361d Suspected of damaging the unborn child.
H372 Causes damage to organs (Liver, Kidney) through prolonged or repeated exposure.

Precautionary statements
Response
P302 + P352 IF ON SKIN: Wash with plenty of soap and water.
P304 + P340 IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact
SAFETY DATA SHEET
according to Regulation (EC) No. 1907/2006

Catalogue No. 102445
Product name Chloroform for analysis EMSURE® ACS,ISO,Reag. Ph Eur

lenses, if present and easy to do. Continue rinsing.
P308 + P310 IF exposed or concerned: immediately call a POISON CENTER or doctor/physician.

For use in industrial installations only.

*Reduced labelling (≤125 ml)*
Hazard pictograms

*Signal word*
Danger

*Hazard statements*
H331 Toxic if inhaled.
H351 Suspected of causing cancer.
H361d Suspected of damaging the unborn child.
H372 Causes damage to organs (Liver, Kidney) through prolonged or repeated exposure.

*Precautionary statements*
P304 + P340 IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
P308 + P310 IF exposed or concerned: immediately call a POISON CENTER or doctor/physician.

*Index-No.* 602-006-00-4

2.3 Other hazards
None known.

SECTION 3. Composition/Information on Ingredients

3.1 Substance

<table>
<thead>
<tr>
<th>Formula</th>
<th>CHCl₃</th>
<th>CHCl₃ (Hill)</th>
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<tbody>
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<td>EC-No.</td>
<td>200-663-8</td>
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<tr>
<td>Molar mass</td>
<td>119.38 g/mol</td>
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</tbody>
</table>

The Safety Data Sheets for catalogue items are available at www.merckgroup.com
SAFETY DATA SHEET

according to Regulation (EC) No. 1907/2006

Catalogue No. 102445
Product name Chloroform for analysis EMSURE® ACS,ISO,Reag. Ph Eur

**Hazardous components (REGULATION (EC) No 1272/2008)**

**Chemical name (Concentration)**

<table>
<thead>
<tr>
<th>CAS-No.</th>
<th>Registration number</th>
<th>Classification</th>
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<tbody>
<tr>
<td>67-66-3</td>
<td>01-2119486657-20-</td>
<td>Carcinogenicity, Category 2, H351</td>
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<tr>
<td></td>
<td>XXXX</td>
<td>Reproductive toxicity, Category 2, H361d</td>
</tr>
<tr>
<td></td>
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<td>Acute toxicity, Category 3, H331</td>
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<tr>
<td></td>
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<td>Acute toxicity, Category 4, H302</td>
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<tr>
<td></td>
<td></td>
<td>Specific target organ toxicity - repeated exposure, Category 1, H372</td>
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<tr>
<td></td>
<td></td>
<td>Eye irritation, Category 2, H319</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Skin irritation, Category 2, H315</td>
</tr>
</tbody>
</table>

**ethanol (>= 1 % - < 3 %)**

*Substance does not meet the criteria for PBT or vPvB according to Regulation (EC) No 1907/2006, Annex XIII.*

<table>
<thead>
<tr>
<th>CAS-No.</th>
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<th>Classification</th>
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<tr>
<td>64-17-5</td>
<td>01-2119457610-43-</td>
<td>Flammable liquid, Category 2, H225</td>
</tr>
<tr>
<td></td>
<td>XXXX</td>
<td>Eye irritation, Category 2, H319</td>
</tr>
</tbody>
</table>

For the full text of the H-Statements mentioned in this Section, see Section 16.

**3.2 Mixture**

Not applicable

**SECTION 4, First aid measures**

**4.1 Description of first aid measures**

*General advice*

First aider needs to protect himself.

After inhalation: fresh air. Immediately call in physician. If breathing stops: immediately apply artificial respiration, if necessary also oxygen.
SAFETY DATA SHEET
according to Regulation (EC) No. 1907/2006

Catalogue No. 102445
Product name Chloroform for analysis EMSURE® ACS,ISO,Reag. Ph Eur

In case of skin contact: Take off immediately all contaminated clothing. Rinse skin with water/shower. Consult a physician.

After eye contact: rinse out with plenty of water. Call in ophthalmologist.

After swallowing: caution if victim vomits. Risk of aspiration! Keep respiratory tract clear.
Pulmonary failure possible after aspiration of vomit. Call a physician immediately. Subsequently administer: activated charcoal (20 - 40 g in 10% slurry).

4.2 Most Important symptoms and effects, both acute and delayed
irritant effects, Cough, Shortness of breath, respiratory arrest, Dizziness, narcosis, agitation, spasms, inebriation, Nausea, Vomiting, Stomach/intestinal disorders, cardiovascular disorders, Headache, ataxia (impaired locomotor coordination)
Drying-out effect resulting in rough and chapped skin.

4.3 Indication of any Immediate medical attention and special treatment needed
Laxative: Sodium sulfate (1 tablespoon/1/4 l water).

SECTION 5. Firefighting measures

5.1 Extinguishing media
Suitable extinguishing media
Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.

Unsuitable extinguishing media
For this substance/mixture no limitations of extinguishing agents are given.

5.2 Special hazards arising from the substance or mixture
Not combustible.
Ambient fire may liberate hazardous vapours.
Fire may cause evolution of:
Hydrogen chloride gas, Phosgene

5.3 Advice for firefighters
SAFETY DATA SHEET
according to Regulation (EC) No. 1907/2006

Catalogue No. 102445
Product name Chloroform for analysis EMSURE® ACS,ISO,Reag. Ph Eur

Special protective equipment for firefighters
Stay in danger area only with self-contained breathing apparatus. Prevent skin contact by keeping a safe distance or by wearing suitable protective clothing.

Further information
Suppress (knock down) gases/vapours/mists with a water spray jet. Prevent fire extinguishing water from contaminating surface water or the ground water system.

SECTION 6. Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
Advice for non-emergency personnel: Do not breathe vapours, aerosols. Avoid substance contact. Ensure adequate ventilation. Evacuate the danger area, observe emergency procedures, consult an expert.

Advice for emergency responders: Protective equipment see section 8.

6.2 Environmental precautions
Do not empty into drains.

6.3 Methods and materials for containment and cleaning up
Cover drains. Collect, bind, and pump off spills. Observe possible material restrictions (see sections 7 and 10). Take up with liquid-absorbent material (e.g. Chemizorb®). Dispose of properly. Clean up affected area. Do not inhale vapours.

6.4 Reference to other sections
Indications about waste treatment see section 13.

SECTION 7. Handling and storage

7.1 Precautions for safe handling
Advice on safe handling
Work under hood. Do not inhale substance/mixture. Avoid generation of vapours/aerosols.

Observe label precautions.
SAFETY DATA SHEET
according to Regulation (EC) No. 1907/2006

Catalogue No. 102445
Product name Chloroform for analysis EMSURE® ACS,ISO,Reag. Ph Eur

Hygiene measures
Immediately change contaminated clothing. Apply preventive skin protection. Wash hands and face after working with substance.

7.2 Conditions for safe storage, including any Incompatibilities
Storage conditions
Protected from light. Tightly closed. Keep in a well-ventilated place. Keep locked up or in an area accessible only to qualified or authorised persons.

Recommended storage temperature see product label.

7.3 Specific end use(s)
See exposure scenario in the Annex to this MSDS.

SECTION 8. Exposure controls/personal protection
8.1 Control parameters
SAFETY DATA SHEET

according to Regulation (EC) No. 1907/2006

Catalogue No. 102445
Product name Chloroform for analysis EMSURE® ACS,ISO,Reag. Ph Eur

Derived No Effect Level (DNEL)

<table>
<thead>
<tr>
<th>Variation</th>
<th>Effect</th>
<th>Route</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Worker DNEL, acute</td>
<td>Systemic effects</td>
<td>Inh.</td>
<td>333 mg/m³</td>
</tr>
<tr>
<td>Worker DNEL, longterm</td>
<td>Systemic effects</td>
<td>Inh.</td>
<td>2.5 mg/m³</td>
</tr>
<tr>
<td>Worker DNEL, longterm</td>
<td>Systemic effects</td>
<td>Dermal</td>
<td>0.94 mg/kg Body weight</td>
</tr>
<tr>
<td>Worker DNEL, longterm</td>
<td>Local effects</td>
<td>Inh.</td>
<td>2.5 mg/m³</td>
</tr>
<tr>
<td>Consumer DNEL, longterm</td>
<td>Systemic effects</td>
<td>Inh.</td>
<td>0.18 mg/m³</td>
</tr>
</tbody>
</table>

Predicted No Effect Concentration (PNEC)

<table>
<thead>
<tr>
<th>Variation</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>PNEC Fresh water</td>
<td>0.146 mg/l</td>
</tr>
<tr>
<td>PNEC Fresh water sediment</td>
<td>0.45 mg/kg</td>
</tr>
<tr>
<td>PNEC Marine water</td>
<td>0.015 mg/l</td>
</tr>
<tr>
<td>PNEC Marine sediment</td>
<td>0.09 mg/kg</td>
</tr>
<tr>
<td>PNEC Aquatic intermittent release</td>
<td>0.133 mg/l</td>
</tr>
<tr>
<td>PNEC Soil</td>
<td>0.56 mg/kg</td>
</tr>
<tr>
<td>PNEC Sewage treatment plant</td>
<td>0.048 mg/l</td>
</tr>
</tbody>
</table>

8.2 Exposure controls

Engineering measures

Technical measures and appropriate working operations should be given priority over the use of personal protective equipment.

See section 7.1.

Individual protection measures

Protective clothing needs to be selected specifically for the workplace, depending on concentrations and quantities of the hazardous substances handled. The chemical resistance of the protective equipment should be enquired at the respective supplier.
SAFETY DATA SHEET
according to Regulation (EC) No. 1907/2006

Catalogue No. 102445
Product name Chloroform for analysis EMSURE® ACS,ISO,Reag. Ph Eur

Eye/face protection
Safety glasses

Hand protection
full contact:
  Glove material: Viton (R)
  Glove thickness: 0,70 mm
  Break through time: > 480 min
splash contact:
  Glove material: butyl-rubber
  Glove thickness: 0,7 mm
  Break through time: > 10 min

The protective gloves to be used must comply with the specifications of EC Directive 89/686/EEC and the related standard EN374, for example KCL 890 Vitoject® (full contact), KCL 898 Butoject® (splash contact).
The breakthrough times stated above were determined by KCL in laboratory tests acc. to EN374 with samples of the recommended glove types.
This recommendation applies only to the product stated in the safety data sheet<> supplied by us and for the designated use. When dissolving in or mixing with other substances and under conditions deviating from those stated in EN374 please contact the supplier of CE-approved gloves (e.g. KCL GmbH, D-36124 Eichenzell, Internet: www.kcl.de).

Other protective equipment
protective clothing

Respiratory protection
required when vapours/aerosols are generated.
Recommended Filter type: Filter AX (EN 371)
The entrepreneur has to ensure that maintenance, cleaning and testing of respiratory protective devices are carried out according to the instructions of the producer. These measures have to be properly documented.

Environmental exposure controls
Do not empty into drains.

The Safety Data Sheets for catalogue items are available at www.merckgroup.com
## SECTION 9. Physical and chemical properties

### 9.1 Information on basic physical and chemical properties

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Form</td>
<td>liquid</td>
</tr>
<tr>
<td>Colour</td>
<td>colourless</td>
</tr>
<tr>
<td>Odour</td>
<td>sweet</td>
</tr>
<tr>
<td>Odour Threshold</td>
<td>84,9 - 201,5 ppm</td>
</tr>
<tr>
<td>pH</td>
<td>No information available.</td>
</tr>
<tr>
<td>Melting point</td>
<td>-63 °C</td>
</tr>
<tr>
<td>Boiling point/boiling range</td>
<td>ca. 61 °C</td>
</tr>
<tr>
<td></td>
<td>at 1.013 hPa</td>
</tr>
<tr>
<td>Flash point</td>
<td>Method: DIN 51755 Part 1 does not flash</td>
</tr>
<tr>
<td>Evaporation rate</td>
<td>No information available.</td>
</tr>
<tr>
<td>Flammability (solid, gas)</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Lower explosion limit</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Upper explosion limit</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Vapour pressure</td>
<td>211 hPa</td>
</tr>
<tr>
<td></td>
<td>at 20 °C</td>
</tr>
<tr>
<td>Relative vapour density</td>
<td>4.25</td>
</tr>
</tbody>
</table>
SAFETY DATA SHEET
according to Regulation (EC) No. 1907/2006

Catalogue No. 102445
Product name Chloroform for analysis EMSURE® ACS,ISO,Reag. Ph Eur

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Density</td>
<td>1.48 g/cm³ at 20 °C</td>
</tr>
<tr>
<td>Relative density</td>
<td>No information available.</td>
</tr>
<tr>
<td>Water solubility</td>
<td>8.7 g/l at 23 °C Method: OECD Test Guideline 105</td>
</tr>
<tr>
<td>Partition coefficient: n-octanol/water</td>
<td>log Pow: 2 (25 °C) (experimental) (IUCLID) Bioaccumulation is not expected.</td>
</tr>
<tr>
<td>Auto-ignition temperature</td>
<td>No information available.</td>
</tr>
<tr>
<td>Decomposition temperature</td>
<td>Distillable in an undecomposed state at normal pressure.</td>
</tr>
<tr>
<td>Viscosity, dynamic</td>
<td>0.57 mPa.s at 20 °C</td>
</tr>
<tr>
<td>Explosive properties</td>
<td>Not classified as explosive.</td>
</tr>
<tr>
<td>Oxidizing properties</td>
<td>none</td>
</tr>
</tbody>
</table>

9.2 Other data
Ignition temperature not combustible

SECTION 10. Stability and reactivity

10.1 Reactivity
See section 10.3

10.2 Chemical stability
heat-sensitive
Sensitivity to light
SAFETY DATA SHEET
according to Regulation (EC) No. 1907/2006

Catalogue No. 102445
Product name Chloroform for analysis EMSURE® ACS,ISO,Reag. Ph Eur

Stabilizer
ethanol

10.3 Possibility of hazardous reactions
Risk of explosion with:
Ammonia, Amines, nitrogen oxides, bases, Oxygen, alkali amides, organic nitro compounds,
strong alkalis, Fluorine, peroxi compounds, Alkaline earth metals, Alkali metals, Powdered metals
Methanol, with, alcoholates
Methanol, with, strong alkalis
Iron, in powder form
various alloys, sensitive to shock
Methanol, with, Sodium hydroxide
magnesium, in powder form
Oxygen, with, alkali compounds
Aluminium, in powder form
Acetone, with, alkali compounds
Potassium, sensitive to shock
sodium, sensitive to shock
Violent reactions possible with:
phosphines, bis(dimethylamino)dimethyl tin, nonmetallic hydrogen compounds, Powdered metals,
Light metals, Ketones, mineral acids, Strong oxidizing agents, semimetallic hydrogen compounds

10.4 Conditions to avoid
no information available

10.5 Incompatible materials
rubber, various plastics

10.6 Hazardous decomposition products
in the event of fire: See section 5.
SECTION 11. Toxicological information

11.1 Information on toxicological effects

Acute oral toxicity
LD50 Rat: 695 mg/kg

(RTECS)

Symptoms: Nausea, Vomiting, Risk of aspiration upon vomiting., Aspiration may cause pulmonary oedema and pneumonitis.

Acute inhalation toxicity
Acute toxicity estimate: 0,5 mg/l; aerosol

Symptoms: Cough, Shortness of breath, Possible damages.; mucosal irritations

Acute dermal toxicity
LD50 Rabbit: > 3.980 mg/kg

(IUCLID)

Skin irritation
Rabbit
Result: slight irritation

(IUCLID)

Drying-out effect resulting in rough and chapped skin.
Causes skin irritation.

Eye irritation
Causes serious eye irritation.
SAFETY DATA SHEET
according to Regulation (EC) No. 1907/2006

Catalogue No. 102445
Product name Chloroform for analysis EMSURE® ACS,ISO,Reag. Ph Eur

Sensitisation
This information is not available.

Germ cell mutagenicity
Genotoxicity in vitro
Ames test
Salmonella typhimurium
Result: negative
Method: OECD Test Guideline 471

Carcinogenicity
This information is not available.

Reproductive toxicity
This information is not available.

Teratogenicity
This information is not available.

CMR effects
Carcinogenicity:
Suspected of causing cancer.

Teratogenicity:
Suspected of damaging the unborn child.

Specific target organ toxicity - single exposure
This information is not available.

Specific target organ toxicity - repeated exposure
Causes damage to organs through prolonged or repeated exposure.
Target Organs: Liver, Kidney

Aspiration hazard
This information is not available.

11.2 Further information
Systemic effects:
After absorption:
SAFETY DATA SHEET

according to Regulation (EC) No. 1907/2006

Catalogue No. 102445
Product name Chloroform for analysis EMSURE® ACS, ISO, Reag. Ph Eur

Dizziness, inebriation, agitation, spasms, narcosis, respiratory arrest
After long-term exposure to the chemical:
- drop in blood pressure, Headache, ataxia (impaired locomotor coordination), Stomach/intestinal disorders, cardiovascular disorders
Damage to:
- Liver, Kidney, Cardiac
Effect potentiated by: ethanol
Other dangerous properties can not be excluded.
This substance should be handled with particular care.

SECTION 12. Ecological Information

12.1 Toxicity

Toxicity to fish
LC50 Lepomis macrochirus (Bluegill sunfish): 18 mg/l; 96 h
(IUCLID)

Toxicity to daphnia and other aquatic invertebrates
EC50 Daphnia magna (Water flea): 79 mg/l; 48 h
(IUCLID)

EC5 E.sulcatum: > 6.560 mg/l; 72 h
(IUCLID) (maximum permissible toxic concentration)

Toxicity to algae
IC5 Scenedesmus quadricauda (Green algae): 1.100 mg/l; 8 d
(IUCLID) (maximum permissible toxic concentration)

Toxicity to bacteria
EC5 Pseudomonas putida: 125 mg/l; 16 h
(IUCLID) (maximum permissible toxic concentration)

EC50 activated sludge: 1.010 mg/l; 3 h
OECD Test Guideline 209

12.2 Persistence and degradability

Biodegradability
0 %; 14 d
OECD Test Guideline 301C
Not readily biodegradable.
SAFETY DATA SHEET
according to Regulation (EC) No. 1907/2006

Catalogue No. 102445
Product name Chloroform for analysis EMSURE® ACS,ISO,Reag. Ph Eur

12.3 Bioaccumulative potential

Partition coefficient: n-octanol/water
log Pow: 2 (25 °C)
(experimental)

(IUCLID) Bioaccumulation is not expected.

12.4 Mobility in soil

Distribution among environmental compartments
Adsorption/Soil
log Koc: 1.72
(experimental)

Mobile in soils

12.5 Results of PBT and vPvB assessment

Substance does not meet the criteria for PBT or vPvB according to Regulation (EC) No 1907/2006, Annex XIII.

12.6 Other adverse effects

Henry constant
14084 Pa*m²/mol
Method: (experimental)
(IUCLID) Distribution preferentially in air.

Discharge into the environment must be avoided.
SAFETY DATA SHEET
according to Regulation (EC) No. 1907/2006

Catalogue No. 102445
Product name Chloroform for analysis EMSURE® ACS, ISO, Reag. Ph Eur

SECTION 13. Disposal considerations

Waste treatment methods
See www.retrologistik.com for processes regarding the return of chemicals and containers, or contact us there if you have further questions.

SECTION 14. Transport Information

Land transport (ADR/RID)

14.1 UN number UN 1888
14.2 Proper shipping name CHLOROFORM
14.3 Class 6.1
14.4 Packing group III
14.5 Environmentally hazardous --
14.6 Special precautions for user yes
Tunnel restriction code E

Inland waterway transport (ADN)
Not relevant

Air transport (IATA)

14.1 UN number UN 1888
14.2 Proper shipping name CHLOROFORM
14.3 Class 6.1
14.4 Packing group III
14.5 Environmentally hazardous --
14.6 Special precautions for user no

Sea transport (IMDG)
SAFETY DATA SHEET

according to Regulation (EC) No. 1907/2006

Catalogue No. 102445
Product name Chloroform for analysis EMSURE® ACS,ISO,Reag. Ph Eur

14.1 UN number UN 1888
14.2 Proper shipping name CHLOROFORM
14.3 Class 6.1
14.4 Packing group III
14.5 Environmentally hazardous --
14.6 Special precautions for user yes
EmS F-A S-A

14.7 Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code
Not relevant

SECTION 15. Regulatory Information

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture

EU regulations
Major Accident Hazard SEVESO III
Legislation ACUTE TOXIC
H2
Quantity 1: 50 t
Quantity 2: 200 t

Occupational restrictions Take note of Dir 94/33/EC on the protection of young people at work.

Observe work restrictions regarding maternity protection in accordance to Dir 92/85/EEC or stricter national regulations where applicable.

Regulation (EC) No 1005/2009 on substances that deplete the ozone layer not regulated

SAFETY DATA SHEET

according to Regulation (EC) No. 1907/2006

<table>
<thead>
<tr>
<th>Catalogue No.</th>
<th>102445</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product name</td>
<td>Chloroform for analysis EMSURE® ACS,ISO,Reag. Ph Eur</td>
</tr>
</tbody>
</table>

Substances of very high concern (SVHC) This product does not contain substances of very high concern according to Regulation (EC) No 1907/2006 (REACH), Article 57 above the respective regulatory concentration limit of ≥ 0.1 % (w/w).

National legislation
Storage class 6.1 D

15.2 Chemical safety assessment
For this product a chemical safety assessment was not carried out.

SECTION 16. Other information

Full text of H-Statements referred to under sections 2 and 3.

H225 Highly flammable liquid and vapour.
H302 Harmful if swallowed.
H315 Causes skin irritation.
H319 Causes serious eye irritation.
H331 Toxic if inhaled.
H351 Suspected of causing cancer.
H361d Suspected of damaging the unborn child.
H372 Causes damage to organs through prolonged or repeated exposure.

Training advice
Provide adequate information, instruction and training for operators.

Labelling
Hazard pictograms

The Safety Data Sheets for catalogue items are available at www.merckgroup.com
SAFETY DATA SHEET
according to Regulation (EC) No. 1907/2006

Catalogue No. 102445
Product name Chloroform for analysis EMSURE® ACS,ISO,Reag. Ph Eur

Signal word
Danger

Hazard statements
H302 Harmful if swallowed.
H315 Causes skin irritation.
H319 Causes serious eye irritation.
H331 Toxic if inhaled.
H351 Suspected of causing cancer.
H361 Suspected of damaging fertility or the unborn child.
H372 Causes damage to organs (Liver, Kidney) through prolonged or repeated exposure.

Precautionary statements
Response
P302 + P352 IF ON SKIN: Wash with plenty of soap and water.
P304 + P340 IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P308 + P310 IF exposed or concerned: immediately call a POISON CENTER or doctor/physician.

Further information

For use in industrial installations only.

Key or legend to abbreviations and acronyms used in the safety data sheet
Used abbreviations and acronyms can be looked up at www.wikipedia.org.

Regional representation
This information is given on the authorised Safety Data Sheet for your country.

The information contained herein is based on the present state of our knowledge. It characterises the product with regard to the appropriate safety precautions. It does not represent a guarantee of any properties of the product.
SAFETY DATA SHEET
according to Regulation (EC) No. 1907/2006

Catalogue No. 102445
Product name Chloroform for analysis EMSURE® ACS,ISO,Reag. Ph Eur

EXPOSURE SCENARIO 1 (Industrial use)

1. Industrial use Reagent for analysis, Chemical production

Sectors of end-use
SU 3 Industrial uses: Uses of substances as such or in preparations at industrial sites
SU9 Manufacture of fine chemicals
SU 10 Formulation [mixing] of preparations and/ or re-packaging (excluding alloys)

Chemical product category
PC19 Intermediate
PC21 Laboratory chemicals

Process categories
PROC1 Use in closed process, no likelihood of exposure
PROC2 Use in closed, continuous process with occasional controlled exposure
PROC3 Use in closed batch process (synthesis or formulation)
PROC8a Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at non-dedicated facilities
PROC8b Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities
PROC9 Transfer of substance or preparation into small containers (dedicated filling line, including weighing)
PROC15 Use as laboratory reagent

Environmental Release Categories
ERC1 Manufacture of substances
ERC6a Industrial use resulting in manufacture of another substance (use of intermediates)

2. Contributing scenarios: Operational conditions and risk management measures
2.1 Contributing scenario controlling environmental exposure for: ERC1

Amount used
Daily amount per site (Msafe) 829.589 kg

The Safety Data Sheets for catalogue items are available at www.merckgroup.com
SAFETY DATA SHEET

according to Regulation (EC) No. 1907/2006

Catalogue No. 102445
Product name Chloroform for analysis EMSURE® ACS,ISO,Reag. Ph Eur

Environment factors not influenced by risk management
- Dilution Factor (River) 10
- Dilution Factor (Coastal Areas) 100

Other given operational conditions affecting environmental exposure
- Number of emission days per year 365
- Emission or Release Factor: Air 0.07 %
- Emission or Release Factor: Water 0.006 %

Conditions and measures related to municipal sewage treatment plant
- Type of Sewage Treatment Plant Municipal sewage treatment plant
- Flow rate of sewage treatment 10.000 m³/d
- Plant effluent
- Percentage removed from waste water 85.6 %
- Sludge Treatment Sewage sludge should not be applied to natural soils.

Conditions and measures related to external treatment of waste for disposal
- Disposal methods All liquid and solid waste should be incinerated.

2.2 Contributing scenario controlling environmental exposure for: ERC6a

Amount used
- Daily amount per site (Msafe) 4.800 kg

Environment factors not influenced by risk management
- Dilution Factor (River) 10
- Dilution Factor (Coastal Areas) 100

Other given operational conditions affecting environmental exposure
- Number of emission days per year 300
- Emission or Release Factor: Air 0.5 %
- Emission or Release Factor: Water 0.7 %

Conditions and measures related to municipal sewage treatment plant

The Safety Data Sheets for catalogue items are available at www.merckgroup.com
SAFETY DATA SHEET
according to Regulation (EC) No. 1907/2006

Catalogue No. 102445
Product name Chloroform for analysis EMSURE® ACS,ISO,Reag. Ph Eur

Type of Sewage Treatment Plant Municipal sewage treatment plant
Flow rate of sewage treatment 10,000 m3/d
plant effluent
Percentage removed from waste 85.6 %
water
Sludge Treatment Sewage sludge should not be applied to natural soils.

Conditions and measures related to external treatment of waste for disposal
Disposal methods All liquid and solid waste should be incinerated.

2.3 Contributing scenario controlling worker exposure for; PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC9, PROC15

Product characteristics
Concentration of the Substance in Covers the percentage of the substance in the product up to
Mixture/Article 100 %.
Physical Form (at time of use) High volatile liquid

Frequency and duration of use
Frequency of use 8 hours/day

Other operational conditions affecting workers exposure
Outdoor / Indoor Indoor with local exhaust ventilation (LEV)
Outdoor / Indoor Outdoor

Technical conditions and measures
Provide extraction ventilation at points where emissions occur.

Organisational measures to prevent /limit releases, dispersion and exposure
Covers daily exposures up to 8 hours.

Conditions and measures related to personal protection, hygiene and health evaluation
Wear suitable gloves (tested to EN374), coverall and eye protection. Wear respiratory protection.

3. Exposure estimation and reference to its source
The Safety Data Sheets for catalogue items are available at www.merckgroup.com
SAFETY DATA SHEET

according to Regulation (EC) No. 1907/2006

Catalogue No. 102445
Product name Chloroform for analysis EMSURE® ACS, ISO, Reag. Ph Eur

Environment

<table>
<thead>
<tr>
<th>CS</th>
<th>Use descriptor</th>
<th>Msafe</th>
<th>Compartment</th>
<th>RCR</th>
<th>Exposure Assessment Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.1</td>
<td>ERC1</td>
<td>829589 kg/day</td>
<td>All compartments</td>
<td>&lt; 1</td>
<td>EUSES</td>
</tr>
<tr>
<td>2.2</td>
<td>ERC6a</td>
<td>4800 kg/day</td>
<td>All compartments</td>
<td>&lt; 1</td>
<td>EUSES</td>
</tr>
</tbody>
</table>

Workers

<table>
<thead>
<tr>
<th>CS</th>
<th>Use descriptor</th>
<th>Exposure duration, route, effect</th>
<th>RCR</th>
<th>Exposure Assessment Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.3</td>
<td>PROC1</td>
<td>longterm, combined, systemic</td>
<td>&lt; 1</td>
<td>ECETOC TRA</td>
</tr>
<tr>
<td>2.3</td>
<td>PROC2</td>
<td>longterm, combined, systemic</td>
<td>&lt; 1</td>
<td>ECETOC TRA</td>
</tr>
<tr>
<td>2.3</td>
<td>PROC3</td>
<td>longterm, combined, systemic</td>
<td>&lt; 1</td>
<td>ECETOC TRA</td>
</tr>
<tr>
<td>2.3</td>
<td>PROC8a</td>
<td>longterm, combined, systemic</td>
<td>&lt; 1</td>
<td>ECETOC TRA</td>
</tr>
<tr>
<td>2.3</td>
<td>PROC8b</td>
<td>longterm, combined, systemic</td>
<td>&lt; 1</td>
<td>ECETOC TRA</td>
</tr>
<tr>
<td>2.3</td>
<td>PROC9</td>
<td>longterm, combined, systemic</td>
<td>&lt; 1</td>
<td>ECETOC TRA</td>
</tr>
<tr>
<td>2.3</td>
<td>PROC15</td>
<td>longterm, combined, systemic</td>
<td>&lt; 1</td>
<td>ECETOC TRA</td>
</tr>
</tbody>
</table>

4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario

Please refer to the following documents: ECHA Guidance on information requirements and chemical safety assessment Chapter R.12: Use descriptor system; ECHA Guidance for downstream users; ECHA Guidance on information requirements and chemical safety assessment Part D: Exposure Scenario Building, Part E: Risk Characterisation and Part G: Extending the SDS; VCI/Cefic REACH Practical Guides on Exposure Assessment and Communications in the Supply Chain; CEFIC Guidance Specific Environmental Release Categories (SPERCs).
SAFETY DATA SHEET
according to Regulation (EC) No. 1907/2006

Catalogue No. 102445
Product name Chloroform for analysis EMSURE® ACS,ISO,Reag. Ph Eur

EXPOSURE SCENARIO 2 (Professional use)

1. Professional use Reagent for analysis, Chemical production)

Sectors of end-use
SU 22 Professional uses: Public domain (administration, education, entertainment, services, craftsmen)

Chemical product category
PC21 Laboratory chemicals

Process categories
PROC15 Use as laboratory reagent

Environmental Release Categories
ERC6a Industrial use resulting in manufacture of another substance (use of intermediates)
ERC8a Wide dispersive indoor use of processing aids in open systems

2. Contributing scenarios: Operational conditions and risk management measures
2.1 Contributing scenario controlling environmental exposure for: ERC6a

Amount used
Daily amount per site (Msafe) 4.800 kg

Environment factors not influenced by risk management
Dilution Factor (River) 10
Dilution Factor (Coastal Areas) 100

Other given operational conditions affecting environmental exposure
Number of emission days per year 300
Emission or Release Factor: Air 0,5 %
Emission or Release Factor: Water 0,7 %

Conditions and measures related to municipal sewage treatment plant
Type of Sewage Treatment Plant Municipal sewage treatment plant
Flow rate of sewage treatment 10.000 m3/d
plant effluent

The Safety Data Sheets for catalogue items are available at www.merckgroup.com
SAFETY DATA SHEET
according to Regulation (EC) No. 1907/2006

Catalogue No. 102445
Product name Chloroform for analysis EMSURE® ACS,ISO,Reag. Ph Eur

Percentage removed from waste water Sludge Treatment
85.6 % Sewage sludge should not be applied to natural soils.

Conditions and measures related to external treatment of waste for disposal
Disposal methods All liquid and solid waste should be incinerated.

2.2 Contributing scenario controlling environmental exposure for: ERC8b

Amount used
Daily amount per site (Msafe) 5 kg

Environment factors not influenced by risk management
Dilution Factor (River) 10
Dilution Factor (Coastal Areas) 100

Other given operational conditions affecting environmental exposure
Number of emission days per year 365

Conditions and measures related to municipal sewage treatment plant
Type of Sewage Treatment Plant none

Conditions and measures related to external treatment of waste for disposal
Disposal methods All liquid and solid waste should be incinerated.

2.3 Contributing scenario controlling worker exposure for: PROC15

Product characteristics
Concentration of the Substance in Mixture/Article Covers the percentage of the substance in the product up to 100 %.
Physical Form (at time of use) High volatile liquid

Frequency and duration of use
Frequency of use 8 hours/day
SAFETY DATA SHEET
according to Regulation (EC) No. 1907/2006

Catalogue No. 102445
Product name Chloroform for analysis EMSURE® ACS,ISO,Reag. Ph Eur

Other operational conditions affecting workers exposure
Outdoor / Indoor Indoor with local exhaust ventilation (LEV)

Technical conditions and measures
Provide extraction ventilation at points where emissions occur.

Organisational measures to prevent /limit releases, dispersion and exposure
Covers daily exposures up to 8 hours.

Conditions and measures related to personal protection, hygiene and health evaluation
Wear suitable gloves (tested to EN374), coverall and eye protection.

3. Exposure estimation and reference to its source

Environment

<table>
<thead>
<tr>
<th>CS</th>
<th>Use descriptor</th>
<th>Msafe</th>
<th>Compartment</th>
<th>RCR</th>
<th>Exposure Assessment Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.1</td>
<td>ERC6a</td>
<td>4800 kg/day</td>
<td>All compartments</td>
<td>&lt; 1</td>
<td>EUSES</td>
</tr>
<tr>
<td>2.2</td>
<td>ERC8b</td>
<td>&lt; 5 l/day</td>
<td>All compartments</td>
<td>&lt; 1</td>
<td>EUSES</td>
</tr>
</tbody>
</table>

Workers

<table>
<thead>
<tr>
<th>CS</th>
<th>Use descriptor</th>
<th>Exposure duration, route, effect</th>
<th>RCR</th>
<th>Exposure Assessment Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.3</td>
<td>PROC15</td>
<td>longterm, combined, systemic</td>
<td>&lt; 1</td>
<td>ECETOC TRA</td>
</tr>
</tbody>
</table>

4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario

Please refer to the following documents: ECHA Guidance on information requirements and chemical safety assessment Chapter R.12: Use descriptor system; ECHA Guidance for downstream users; ECHA Guidance on information requirements and chemical safety assessment Part D: Exposure Scenario Building, Part E: Risk Characterisation and Part G: Extending the SDS; VCI/Cefic REACH Practical Guides on Exposure Assessment and Communications in the Supply Chain; CEFIC Guidance Specific Environmental Release Categories (SPERCs).
SAFETY DATA SHEET
according to Regulation (EC) No. 1907/2006

<table>
<thead>
<tr>
<th>Catalogue No.</th>
<th>102445</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product name</td>
<td>Chloroform for analysis EMSURE® ACS,ISO,Reag. Ph Eur</td>
</tr>
</tbody>
</table>
1. Identification of the substance/preparation and the company

<table>
<thead>
<tr>
<th>Commercial product name</th>
<th>Chlorinated paraffin (CP70%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use of the substance/preparation</td>
<td>High-pressure lubricants, as flame retardants in plastics and textiles, as plasticizer for polyvinyl chloride in polyethylene sealants, and in detergents</td>
</tr>
<tr>
<td>Synonyms</td>
<td>Chlorinated paraffin wax, alkanes C14-C17, chloroparaffins</td>
</tr>
<tr>
<td>CAS-nr</td>
<td>85535-85-9</td>
</tr>
<tr>
<td>EC-nr</td>
<td>287-477-0</td>
</tr>
<tr>
<td>REACH reg. nr</td>
<td>01-2119519269-33-0000</td>
</tr>
<tr>
<td>Company</td>
<td>Fred Holmberg &amp; Co AB</td>
</tr>
<tr>
<td>Address</td>
<td>Box 60056 S-216 10 Limhamn Sweden</td>
</tr>
<tr>
<td>Telephone number</td>
<td>+46 (0)40 15 79 20</td>
</tr>
<tr>
<td>Fax</td>
<td>+46 (0)40 16 22 95</td>
</tr>
<tr>
<td>E-mail</td>
<td><a href="mailto:fred.info@holmberg.se">fred.info@holmberg.se</a></td>
</tr>
<tr>
<td>Contact person</td>
<td>Fred Holmberg</td>
</tr>
<tr>
<td>Emergency telephone number</td>
<td>Fred Holmberg 040-15 79 20 (office hours) or. 08-33 12 31 toxicity information central (office hours), 112 for emergency central</td>
</tr>
<tr>
<td>Created by</td>
<td>Linus Olofsson, Fred Holmberg &amp; Co AB, Tel. +46 (0)480-42 20 00</td>
</tr>
</tbody>
</table>

2. Hazards Identification

Classification acc. to CLP: H362, H400, H410 (CLP)  Previous classification: Xn; R64, R66, N; R50-53  See point 15 for explanation.

Health hazard:
May cause harm to breast-fed children. Very toxic to aquatic life. Very toxic to aquatic life with long lasting effects.

3. Composition/Information on ingredients

<table>
<thead>
<tr>
<th>EG-nr</th>
<th>CAS-nr</th>
<th>Substance name</th>
<th>%-weight</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>287-477-0</td>
<td>85535-85-9</td>
<td>2-aminoethanol</td>
<td>100</td>
<td>H362, H400, H410 (CLP) Xn; R64, R66, N; R50-53</td>
</tr>
</tbody>
</table>
### 4. First aid measures

<table>
<thead>
<tr>
<th>Inhalation</th>
<th>Move person to fresh air; if effects occur, consult a physician.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skin contact</td>
<td>Take off contaminated clothing. Wash skin with plenty of water; if effects occur, consult a physician.</td>
</tr>
<tr>
<td>Eye contact</td>
<td>Flush eyes thoroughly with water for several minutes. Remove contact lenses after the initial 1-2 minutes and continue flushing for several additional minutes. If effects occur, consult a physician, preferably an ophthalmologist.</td>
</tr>
<tr>
<td>Ingestion</td>
<td>Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. If effects occur, consult a physician.</td>
</tr>
<tr>
<td>Protection of first-aiders</td>
<td>No special precautions required.</td>
</tr>
<tr>
<td>Notes to physician</td>
<td>Treat symptomatically.</td>
</tr>
</tbody>
</table>

### 5. Fire-fighting measures

<table>
<thead>
<tr>
<th>Suitable extinguishing media</th>
<th>Use dry chemical, CO2, water spray or alcohol resistant foam.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extinguishing media which must not be used for safety reason</td>
<td>None</td>
</tr>
<tr>
<td>Hazards from Combustion Products</td>
<td>Product may emit hydrochloric acid. Burning produces obnoxious and toxic fumes. CO, CO2, NOx. Fire residues and contaminated fire extinguishing water must be disposed of in accordance with local regulations. Cool containers / tanks with spray water.</td>
</tr>
<tr>
<td>Special protective equipment for firefighters</td>
<td>Wear personal protective equipment. Wear self contained breathing apparatus for firefighting if necessary.</td>
</tr>
</tbody>
</table>

### 6. Accidental release measures

<table>
<thead>
<tr>
<th>Personal precautions</th>
<th>Sweep-up to prevent slipping hazard. Evacuate personnel to safe areas. Avoid contact with skin and eyes. Wear personal protective equipment. Eliminate all sources of ignition. Increase ventilation. Use spark-proof equipment.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental precautions</td>
<td>Prevent product from entering drains.</td>
</tr>
<tr>
<td>Methods for cleaning up</td>
<td>Adsorb with inert material (e.g. sand, kieselguhr, acid binder, universal binder, sawdust) Sweep up and shovel into suitable containers for disposal. Dispose of in accordance with local regulations.</td>
</tr>
</tbody>
</table>
7. Handling and storage

<table>
<thead>
<tr>
<th>Storage</th>
<th>Handle in accordance with good industrial hygiene and safety practice for diagnostics. Keep in properly labelled containers. Keep tightly closed in a dry, cool (&lt;40 °C) and well-ventilated place. <strong>Storage Life</strong> 2 Years if stored in accordance to the advice given above.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Handling</td>
<td>Impervious gloves. Wear personal protective equipment. When using, do not eat, drink or smoke. Handle in accordance with good industrial hygiene and safety practice.</td>
</tr>
</tbody>
</table>

8. Exposure controls/personal protection

<table>
<thead>
<tr>
<th>Respiratory protection</th>
<th>In case of insufficient ventilation wear suitable respiratory equipment.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hand protection</td>
<td>Use gloves chemically resistant to this material when prolonged or frequently repeated contact could occur.</td>
</tr>
<tr>
<td>Skin and body protection</td>
<td>When prolonged or frequently repeated contact could occur, use protective clothing chemically resistant to this material.</td>
</tr>
<tr>
<td>Eye protection</td>
<td>Face-shield Safety glasses</td>
</tr>
<tr>
<td>Hygiene measures</td>
<td>Handle in accordance with good industrial hygiene and safety practice.</td>
</tr>
</tbody>
</table>

9. Physical and chemical properties

<table>
<thead>
<tr>
<th>Appearance</th>
<th>Pale yellow clear viscous liquid</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chlorine Content</td>
<td>70 + 2 (ISI-1448-77)</td>
</tr>
<tr>
<td>Paraffin Range</td>
<td>C14 - C17</td>
</tr>
<tr>
<td>pH</td>
<td>6.0 - 6.5</td>
</tr>
<tr>
<td>Sp. Gravity at 20°C</td>
<td>1.540 + 0.02 (ASTM-D-1045)</td>
</tr>
<tr>
<td>Viskositet (50°C (poise))</td>
<td>2000 – 5000</td>
</tr>
<tr>
<td>Color (HU) Max</td>
<td>150 (ASTM-1045)</td>
</tr>
<tr>
<td>Heat Stability at 180°C for 1 Hr.</td>
<td>Color turns to dark yellow / brown</td>
</tr>
<tr>
<td>Volatile loss (% Max)</td>
<td>1.0% (at 130°C / 3 Hr.)</td>
</tr>
</tbody>
</table>
10. Stability and reactivity

<table>
<thead>
<tr>
<th>Stability</th>
<th>Stable at normal use conditions/temperatures.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Materials to avoid</td>
<td>strong acids, strong oxidants, alkali metals.</td>
</tr>
<tr>
<td>Conditions to avoid</td>
<td>high temperature.</td>
</tr>
<tr>
<td>Hazardous decomposition products</td>
<td>carbon oxides (CO, CO2), hydrogen chloride (HCl).</td>
</tr>
</tbody>
</table>

11. Toxicological information

Acute toxicity:
Low toxicity when swallowed, LD50 (oral): 4000 mg/kg bw

Possible health effects:

Inhalation: May be irritating if inhaled.

Ingestion: May be harmful if swallowed.

Skin: Repeated exposure may cause skin dryness or cracking.

Eyes: May irritate eyes upon exposure.

12. Ecotoxicological information

Ecotoxicity:

Toxicity to aquatic species:
Daphnia magna 48 hr – EC50 = 0.0059 mg/l
Fish (Albumus albumus) 96 hr – LC50 = > 5000 mg/l
Crustacean (Gammarus pulex) 96 hr – LC50 = 1.0 mg/l
Harpacticoid (Nitocra spinipes) 96 hr – LC50 = 9 mg/l
Algae (Selenastrum capricornutum) 96 hr – EC50 (biomas) = > 3.2 mg/l

Biodegradability: The product is partially removed in biological treatment process. Biodegradation appears to occur under both aerobic and anaerobic conditions, but the data is poor.

Bio-Accumulation: No relevant data is available.

Mobility: If released into water the product will sink. The product is involatile and insoluble and will accumulate in the ground.
13. Disposal considerations

<table>
<thead>
<tr>
<th>Contaminated packaging</th>
<th>Empty containers should be transported/delivered to local recyclers for disposal.</th>
</tr>
</thead>
</table>

Any disposal practice must be in compliance with all local and national laws and regulations. Do not dump into any sewers, on the ground, or into any body of water.

14. Transport information

Proper shipping name  
Environmentally Hazardous Substance, Liquid, N.O.S  
(Chlorinated Paraffin, C14-C17)

ROAD TRANSPORT (ADR):

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>UN no. road</td>
<td>3082</td>
</tr>
<tr>
<td>ADR class</td>
<td>9</td>
</tr>
<tr>
<td>ADR Hazard labels</td>
<td>90</td>
</tr>
<tr>
<td>ADR packing group</td>
<td>III</td>
</tr>
</tbody>
</table>

RAIL TRANSPORT (RID):

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>UN no. rail road</td>
<td>3082</td>
</tr>
<tr>
<td>RID class no.</td>
<td>9</td>
</tr>
<tr>
<td>RID Hazard labels</td>
<td>90</td>
</tr>
<tr>
<td>RID packing group</td>
<td>III</td>
</tr>
</tbody>
</table>

SEA TRANSPORT (IMDG):

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>UN no. sea</td>
<td>3082</td>
</tr>
<tr>
<td>IMDG class</td>
<td>9</td>
</tr>
<tr>
<td>IMDG packing group</td>
<td>III</td>
</tr>
<tr>
<td>EmS no.</td>
<td>F-E, S-D</td>
</tr>
</tbody>
</table>
15. Regulatory information

Labelling according Regulation (EC) No 1272/2008 [CLP]

Signal word       Warning

Hazard statement(s)
H362: May cause harm to breast-fed children.
H400: Very toxic to aquatic life.
H410: Very toxic to aquatic life with long lasting effects.

Precautionary statement(s)
P201: Obtain special instructions before use.
P263: Avoid contact during pregnancy/during nursing.
P264: Wash with soap and water thoroughly after handling.
P270: Do not eat, drink or smoke when using this product.
P273: Avoid release to the environment.
P308+P313: If exposed or concerned, get medical advice/attention.
P391: Collect spillage.
P501: Dispose off contents/container as hazardous waste according to local regulations.


Safety Data Sheet Chlorinated paraffin (CP70%)
S2: Keep out of the reach of children.
S24: Avoid contact with skin.
S60: This material and its container must be disposed of as hazardous waste.
S61: Avoid release to the environment. Refer to special instructions / safety data sheets.

16. Remaining information

The information in this data sheet is considered to be correct according to present knowledge and experience, but there is no guarantee that it is complete. It is therefore in the user’s interest to ensure that the information is sufficient for the area it is intended for.
SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers

Product name: Sulfuric acid

Product Number: 339741
Brand: Aldrich
Index-No.: 016-020-00-8
REACH No.: 01-2119458838-20-XXXX
CAS-No.: 7664-93-9

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses: Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet

Company: Sigma-Aldrich Chemie GmbH
Riedstrasse 2
D-89555 STEINHEIM

Telephone: +49 89-6513-1444
Fax: +49 7329-97-2319
E-mail address: eurtechserv@sial.com

1.4 Emergency telephone number

Emergency Phone #: 0800 181 7059 (CHEMTREC Deutschland)
+49 (0)696 43508409 (CHEMTREC weltweit)

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

Classification according to Regulation (EC) No 1272/2008
Corrosive to metals (Category 1), H290
Skin corrosion (Category 1A), H314

For the full text of the H-Statements mentioned in this Section, see Section 16.

Classification according to EU Directives 67/548/EEC or 1999/45/EC
Corrosive R35

For the full text of the R-phrases mentioned in this Section, see Section 16.

2.2 Label elements

Labelling according Regulation (EC) No 1272/2008

Pictogram

Signal word: Danger

Hazard statement(s)
H290: May be corrosive to metals.
H314: Causes severe skin burns and eye damage.

Precautionary statement(s)
P280: Wear protective gloves/ protective clothing/ eye protection/ face
2.3 Other hazards
This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

SECTION 3: Composition/information on ingredients

3.1 Substances
Formula : H₂O₄S
Molecular weight : 98.08 g/mol
CAS-No. : 7664-93-9
EC-No. : 231-639-5
Index-No. : 016-020-00-8
Registration number : 01-2119458838-20-XXX

Hazardous ingredients according to Regulation (EC) No 1272/2008

<table>
<thead>
<tr>
<th>Component</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sulfuric acid</td>
<td></td>
</tr>
<tr>
<td>CAS-No.</td>
<td>7664-93-9</td>
</tr>
<tr>
<td>EC-No.</td>
<td>231-639-5</td>
</tr>
<tr>
<td>Index-No.</td>
<td>016-020-00-8</td>
</tr>
<tr>
<td>Registration number</td>
<td>01-2119458838-20-XXX</td>
</tr>
<tr>
<td>Met. Corr. 1; Skin Corr. 1A; H290, H314</td>
<td>&lt;= 100 %</td>
</tr>
</tbody>
</table>

Hazardous ingredients according to Directive 1999/45/EC

<table>
<thead>
<tr>
<th>Component</th>
<th>Classification</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sulfuric acid</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CAS-No.</td>
<td>7664-93-9</td>
<td></td>
</tr>
<tr>
<td>EC-No.</td>
<td>231-639-5</td>
<td></td>
</tr>
<tr>
<td>Index-No.</td>
<td>016-020-00-8</td>
<td></td>
</tr>
<tr>
<td>Registration number</td>
<td>01-2119458838-20-XXX</td>
<td></td>
</tr>
<tr>
<td>C, R35</td>
<td>&lt;= 100 %</td>
<td></td>
</tr>
</tbody>
</table>

For the full text of the H-Statements and R-Phrases mentioned in this Section, see Section 16

SECTION 4: First aid measures

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Take off contaminated clothing and shoes immediately. Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If swallowed
Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11
4.3 Indication of any immediate medical attention and special treatment needed
No data available

SECTION 5: Firefighting measures

5.1 Extinguishing media
Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
Sulphur oxides

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
No data available

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
Wear respiratory protection. Avoid breathing vapours, mist or gas. Ensure adequate ventilation.
Evacuate personnel to safe areas.
For personal protection see section 8.

6.2 Environmental precautions
Do not let product enter drains.

6.3 Methods and materials for containment and cleaning up
Soak up with inert absorbent material and dispose of as hazardous waste. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling
Avoid inhalation of vapour or mist.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Store in cool place. Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.
Storage class (TRGS 510): Non-combustible, corrosive hazardous materials

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Components with workplace control parameters

<table>
<thead>
<tr>
<th>Derived No Effect Level (DNEL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Application Area</td>
</tr>
<tr>
<td>-----------------</td>
</tr>
<tr>
<td>Workers</td>
</tr>
<tr>
<td>Workers</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Predicted No Effect Concentration (PNEC)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compartment</td>
</tr>
<tr>
<td>-------------</td>
</tr>
<tr>
<td>Marine water</td>
</tr>
</tbody>
</table>
8.2 Exposure controls
Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection
Tightly fitting safety goggles. Faceshield (8-inch minimum). Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove’s outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

The selected protective gloves have to satisfy the specifications of EU Directive 89/686/EEC and the standard EN 374 derived from it.

Full contact
Material: Fluorinated rubber
Minimum layer thickness: 0.7 mm
Break through time: 480 min
Material tested: Vitoject® (KCL 890 / Aldrich Z677698, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.2 mm
Break through time: 30 min
Material tested: Dermatril® P (KCL 743 / Aldrich Z677388, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Do not let product enter drains.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Fresh water</td>
<td>0.0025 mg/l</td>
</tr>
<tr>
<td>Marine sediment</td>
<td>0.002 mg/kg</td>
</tr>
<tr>
<td>Fresh water sediment</td>
<td>0.002 mg/kg</td>
</tr>
<tr>
<td>Onsite sewage treatment plant</td>
<td>8.8 mg/l</td>
</tr>
</tbody>
</table>

a) Appearance      Form: clear, liquid
b) Odour No data available
c) Odour Threshold No data available
d) pH 1,2 at 5 g/l
e) Melting point/freezing point 3 °C
f) Initial boiling point and boiling range 290 °C - lit.
g) Flash point Not applicable
h) Evaporation rate No data available
i) Flammability (solid, gas) No data available
j) Upper/lower flammability or explosive limits No data available
k) Vapour pressure 1,33 hPa at 145,8 °C
l) Vapour density 3,39 - (Air = 1.0)
m) Relative density 1,84 g/cm3 at 25 °C
n) Water solubility soluble
o) Partition coefficient: n-octanol/water No data available
p) Auto-ignition temperature No data available
q) Decomposition temperature No data available
r) Viscosity No data available
s) Explosive properties No data available
t) Oxidizing properties No data available

9.2 Other safety information
Surface tension 55,1 mN/m at 20 °C
Relative vapour density 3,39 - (Air = 1.0)

SECTION 10: Stability and reactivity
10.1 Reactivity
No data available
10.2 Chemical stability
Stable under recommended storage conditions.
10.3 Possibility of hazardous reactions
No data available
10.4 Conditions to avoid
No data available
10.5 Incompatible materials
Bases, Halides, Organic materials, Carbides, fulminates, Nitrates, picrates, Cyanides, Chlorates, alkali halides, Zinc salts, permanganates, e.g. potassium permanganate, Hydrogen peroxide, Azides, Perchlorates., Nitromethane, phosphorous, Reacts violently with; cyclopentadiene, cyclopentanone oxime, nitroaryl amines, hexalithium disilicide, phosphorous(III) oxide, Powdered metals
10.6 Hazardous decomposition products
Other decomposition products - No data available
SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - 2.140 mg/kg
LC50 Inhalation - Rat - 2 h - 510 mg/m3

Skin corrosion/irritation
Skin - Rabbit
Result: Extremely corrosive and destructive to tissue.

Serious eye damage/eye irritation
Eyes - Rabbit
Result: Corrosive to eyes

Respiratory or skin sensitisation
No data available

Germ cell mutagenicity
No data available

Carcinogenicity
The International Agency for Research on Cancer (IARC) has determined that occupational exposure to strong-inorganic-acid mists containing sulfuric acid is carcinogenic to humans (group 1).

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

Reproductive toxicity
No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

Additional Information
RTECS: WS6600000
Material is extremely destructive to tissue of the mucous membranes and upper respiratory tract, eyes, and skin., spasm, inflammation and edema of the larynx, spasm, inflammation and edema of the bronchi, pneumonitis, pulmonary edema, burning sensation, Cough, wheezing, laryngitis, Shortness of breath, Headache, Nausea, Vomiting, Pulmonary edema. Effects may be delayed., To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

SECTION 12: Ecological information

12.1 Toxicity
Toxicity to fish LC50 - Gambusia affinis (Mosquito fish) - 42 mg/l - 96 h
Toxicity to daphnia and other aquatic invertebrates EC50 - Daphnia magna (Water flea) - 29 mg/l - 24 h

12.2 Persistence and degradability
The methods for determining the biological degradability are not applicable to inorganic substances.

12.3 Bioaccumulative potential
No data available
12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

12.6 Other adverse effects

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product
Offer surplus and non-recyclable solutions to a licensed disposal company.

Contaminated packaging
Dispose of as unused product.

SECTION 14: Transport information

14.1 UN number
ADR/RID: 1830 IMDG: 1830 IATA: 1830

14.2 UN proper shipping name
ADR/RID: SULPHURIC ACID
IMDG: SULPHURIC ACID
IATA: Sulphuric acid

14.3 Transport hazard class(es)
ADR/RID: 8 IMDG: 8 IATA: 8

14.4 Packaging group
ADR/RID: II IMDG: II IATA: II

14.5 Environmental hazards
ADR/RID: no IMDG Marine pollutant: no IATA: no

14.6 Special precautions for user
No data available

SECTION 15: Regulatory information
This safety datasheet complies with the requirements of Regulation (EC) No. 1907/2006.

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture
No data available

15.2 Chemical Safety Assessment
A Chemical Safety Assessment has been carried out for this substance.

SECTION 16: Other information
Full text of H-Statements referred to under sections 2 and 3.
H290 May be corrosive to metals.
H314 Causes severe skin burns and eye damage.
Met. Corr. Corrosive to metals
Skin Corr. Skin corrosion

Full text of R-phrases referred to under sections 2 and 3
C Corrosive
R35 Causes severe burns.
Further information

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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.
SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers

Product name: Sulfuric acid

Product Number: 339741
Brand: Aldrich
Index-No.: 016-020-00-8
REACH No.: 01-2119458838-20-XXXX
CAS-No.: 7664-93-9

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses: Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet

Company: Sigma-Aldrich Chemie GmbH
Riedstrasse 2
D-89555 STEINHEIM

Telephone: +49 89-6513-1444
Fax: +49 7329-97-2319
E-mail address: eurtechserv@sigma.com

1.4 Emergency telephone number

Emergency Phone #: 0800 181 7059 (CHEMTREC Deutschland)
+49 (0)696 43508409 (CHEMTREC weltweit)

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

Classification according to Regulation (EC) No 1272/2008
Corrosive to metals (Category 1), H290
Skin corrosion (Category 1A), H314

For the full text of the H-Statements mentioned in this Section, see Section 16.

Classification according to EU Directives 67/548/EEC or 1999/45/EC
C Corrosive R35

For the full text of the R-phrases mentioned in this Section, see Section 16.

2.2 Label elements

Labelling according Regulation (EC) No 1272/2008

Pictogram

Signal word: Danger

Hazard statement(s)
H290 May be corrosive to metals.
H314 Causes severe skin burns and eye damage.

Precautionary statement(s)
P280 Wear protective gloves/ protective clothing/ eye protection/ face
2.3 Other hazards
This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

SECTION 3: Composition/information on ingredients

3.1 Substances
Formula : H₂O₄S
Molecular weight : 98.08 g/mol
CAS-No. : 7664-93-9
EC-No. : 231-639-5
Index-No. : 016-020-00-8
Registration number : 01-2119458838-20-XXXX

<table>
<thead>
<tr>
<th>Component</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sulfuric acid</td>
<td>Met. Corr. 1; Skin Corr. 1A; H290, H314 &lt;= 100 %</td>
</tr>
</tbody>
</table>

Hazardous ingredients according to Directive 1999/45/EC

<table>
<thead>
<tr>
<th>Component</th>
<th>Classification</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sulfuric acid</td>
<td>C, R35 &lt;= 100 %</td>
<td></td>
</tr>
</tbody>
</table>

For the full text of the H-Statements and R-Phrases mentioned in this Section, see Section 16

SECTION 4: First aid measures

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Take off contaminated clothing and shoes immediately. Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If swallowed
Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11
4.3 Indication of any immediate medical attention and special treatment needed
No data available

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture

Sulphur oxides

5.3 Advice for firefighters

Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
No data available

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

Wear respiratory protection. Avoid breathing vapours, mist or gas. Ensure adequate ventilation.
Evacuate personnel to safe areas.
For personal protection see section 8.

6.2 Environmental precautions

Do not let product enter drains.

6.3 Methods and materials for containment and cleaning up

Soak up with inert absorbent material and dispose of as hazardous waste. Keep in suitable, closed
counters for disposal.

6.4 Reference to other sections

For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling

Avoid inhalation of vapour or mist.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Store in cool place. Keep container tightly closed in a dry and well-ventilated place. Containers which are
opened must be carefully resealed and kept upright to prevent leakage.
Storage class (TRGS 510): Non-combustible, corrosive hazardous materials

7.3 Specific end use(s)

Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Components with workplace control parameters

Derived No Effect Level (DNEL)

<table>
<thead>
<tr>
<th>Application Area</th>
<th>Exposure routes</th>
<th>Health effect</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Workers</td>
<td>Inhalation</td>
<td>Acute local effects</td>
<td>0,1 mg/m3</td>
</tr>
<tr>
<td>Workers</td>
<td>Inhalation</td>
<td>Long-term local effects</td>
<td>0,05 mg/m3</td>
</tr>
</tbody>
</table>

Predicted No Effect Concentration (PNEC)

<table>
<thead>
<tr>
<th>Compartment</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marine water</td>
<td>0,00025 mg/l</td>
</tr>
</tbody>
</table>
8.2 Exposure controls

**Appropriate engineering controls**
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

**Personal protective equipment**

**Eye/face protection**
Tightly fitting safety goggles. Faceshield (8-inch minimum). Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

**Skin protection**
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

The selected protective gloves have to satisfy the specifications of EU Directive 89/686/EEC and the standard EN 374 derived from it.

Full contact
Material: Fluorinated rubber
Minimum layer thickness: 0,7 mm
Break through time: 480 min
Material tested:Vitoject® (KCL 890 / Aldrich Z677698, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0,2 mm
Break through time: 30 min
Material tested:Dermatril® P (KCL 743 / Aldrich Z677388, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

**Body Protection**
Complete suit protecting against chemicals. The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

**Respiratory protection**
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

**Control of environmental exposure**
Do not let product enter drains.

---

### SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a) **Appearance**: Form: clear, liquid
b) Odour No data available
c) Odour Threshold No data available
d) pH 1,2 at 5 g/l
e) Melting point/freezing point 3 °C
f) Initial boiling point and boiling range 290 °C - lit.
g) Flash point Not applicable
h) Evaporation rate No data available
i) Flammability (solid, gas) No data available
j) Upper/lower flammability or explosive limits No data available

k) Vapour pressure 1,33 hPa at 145,8 °C
l) Vapour density 3,39 - (Air = 1.0)
m) Relative density 1,84 g/cm3 at 25 °C
n) Water solubility soluble
o) Partition coefficient: n-octanol/water No data available
p) Auto-ignition temperature No data available
q) Decomposition temperature No data available
r) Viscosity No data available
s) Explosive properties No data available
t) Oxidizing properties No data available

9.2 Other safety information
Surface tension 55,1 mN/m at 20 °C
Relative vapour density 3,39 - (Air = 1.0)

SECTION 10: Stability and reactivity

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
No data available

10.5 Incompatible materials
Bases, Halides, Organic materials, Carbides, fulminates, Nitrates, picrates, Cyanides, Chlorates, alkali halides, Zinc salts, permanganates, e.g. potassium permanganate, Hydrogen peroxide, Azides, Perchlorates., Nitromethane, phosphorous, Reacts violently with:, cyclopentadiene, cyclopentanone oxime, nitroaryl amines, hexalithium disilicide, phosphorous(III) oxide, Powdered metals

10.6 Hazardous decomposition products
Other decomposition products - No data available
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - 2.140 mg/kg
LC50 Inhalation - Rat - 2 h - 510 mg/m3

Skin corrosion/irritation
Skin - Rabbit
Result: Extremely corrosive and destructive to tissue.

Serious eye damage/eye irritation
Eyes - Rabbit
Result: Corrosive to eyes

Respiratory or skin sensitisation
No data available

Germ cell mutagenicity
No data available

Carcinogenicity
The International Agency for Research on Cancer (IARC) has determined that occupational exposure to strong-inorganic-acid mists containing sulfuric acid is carcinogenic to humans (group 1).
IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

Reproductive toxicity
No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

Additional Information
RTECS: WS6600000
Material is extremely destructive to tissue of the mucous membranes and upper respiratory tract, eyes, and skin., spasm, inflammation and edema of the larynx, spasm, inflammation and edema of the bronchi, pneumonitis, pulmonary edema, burning sensation, Cough, wheezing, laryngitis, Shortness of breath, Headache, Nausea, Vomiting, Pulmonary edema. Effects may be delayed., To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

SECTION 12: Ecological information

12.1 Toxicity
Toxicity to fish
LC50 - Gambusia affinis (Mosquito fish) - 42 mg/l - 96 h
Toxicity to daphnia and other aquatic invertebrates
EC50 - Daphnia magna (Water flea) - 29 mg/l - 24 h

12.2 Persistence and degradability
The methods for determining the biological degradability are not applicable to inorganic substances.

12.3 Bioaccumulative potential
No data available
12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

12.6 Other adverse effects

SECTION 13: Disposal considerations

13.1 Waste treatment methods
Product
Offer surplus and non-recyclable solutions to a licensed disposal company.

Contaminated packaging
Dispose of as unused product.

SECTION 14: Transport information

14.1 UN number
ADR/RID: 1830    IMDG: 1830    IATA: 1830

14.2 UN proper shipping name
ADR/RID: SULPHURIC ACID    IMDG: SULPHURIC ACID    IATA: Sulphuric acid

14.3 Transport hazard class(es)
ADR/RID: 8    IMDG: 8    IATA: 8

14.4 Packaging group
ADR/RID: II    IMDG: II    IATA: II

14.5 Environmental hazards
ADR/RID: no    IMDG Marine pollutant: no    IATA: no

14.6 Special precautions for user
No data available

SECTION 15: Regulatory information

This safety datasheet complies with the requirements of Regulation (EC) No. 1907/2006.

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture
No data available

15.2 Chemical Safety Assessment
A Chemical Safety Assessment has been carried out for this substance.

SECTION 16: Other information

Full text of H-statements referred to under sections 2 and 3.
H290 May be corrosive to metals.
H314 Causes severe skin burns and eye damage.
Met. Corr. Corrosive to metals
Skin Corr. Skin corrosion

Full text of R-phrases referred to under sections 2 and 3
C Corrosive
R35 Causes severe burns.
Further information
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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.
SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers
   Product name : Sulfuric acid
   
   Product Number : 339741
   Brand : Aldrich
   Index-No. : 016-020-00-8
   REACH No. : 01-2119458838-20-XXXX
   CAS-No. : 7664-93-9

1.2 Relevant identified uses of the substance or mixture and uses advised against
   Identified uses : Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet
   Company : Sigma-Aldrich Chemie GmbH
   Riedstrasse 2
   D-89555 STEINHEIM

   Telephone : +49 89-6513-1444
   Fax : +49 7329-97-2319
   E-mail address : eurtechserv@sial.com

1.4 Emergency telephone number
   Emergency Phone # : 0800 181 7059 (CHEMTREC Deutschland)
   +49 (0)696 43508409 (CHEMTREC weltweit)

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture
   Classification according to Regulation (EC) No 1272/2008
   Corrosive to metals (Category 1), H290
   Skin corrosion (Category 1A), H314

   For the full text of the H-Statements mentioned in this Section, see Section 16.

   Classification according to EU Directives 67/548/EEC or 1999/45/EC
   C Corrosive R35

   For the full text of the R-phrases mentioned in this Section, see Section 16.

2.2 Label elements
   Labelling according Regulation (EC) No 1272/2008
   Pictogram

   Signal word : Danger
   Hazard statement(s)
   H290 : May be corrosive to metals.
   H314 : Causes severe skin burns and eye damage.
   Precautionary statement(s)
   P280 : Wear protective gloves/ protective clothing/ eye protection/ face
2.3 Other hazards
This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

SECTION 3: Composition/information on ingredients

3.1 Substances

<table>
<thead>
<tr>
<th>Component</th>
<th>Classification</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sulfuric acid</td>
<td>Met. Corr. 1; Skin Corr. 1A; H290, H314</td>
<td>&lt;= 100 %</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Component</th>
<th>Classification</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sulfuric acid</td>
<td>C, R35</td>
<td>&lt;= 100 %</td>
</tr>
</tbody>
</table>

For the full text of the H-Statements and R-Phrases mentioned in this Section, see Section 16

SECTION 4: First aid measures

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Take off contaminated clothing and shoes immediately. Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If swallowed
Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11
4.3 Indication of any immediate medical attention and special treatment needed
No data available

SECTION 5: Firefighting measures

5.1 Extinguishing media
Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
Sulphur oxides

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
No data available

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
Wear respiratory protection. Avoid breathing vapours, mist or gas. Ensure adequate ventilation.
Evacuate personnel to safe areas.
For personal protection see section 8.

6.2 Environmental precautions
Do not let product enter drains.

6.3 Methods and materials for containment and cleaning up
Soak up with inert absorbent material and dispose of as hazardous waste. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling
Avoid inhalation of vapour or mist.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Store in cool place. Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.
Storage class (TRGS 510): Non-combustible, corrosive hazardous materials

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Components with workplace control parameters

Derived No Effect Level (DNEL)

<table>
<thead>
<tr>
<th>Application Area</th>
<th>Exposure routes</th>
<th>Health effect</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Workers</td>
<td>Inhalation</td>
<td>Acute local effects</td>
<td>0,1 mg/m3</td>
</tr>
<tr>
<td>Workers</td>
<td>Inhalation</td>
<td>Long-term local effects</td>
<td>0,05 mg/m3</td>
</tr>
</tbody>
</table>

Predicted No Effect Concentration (PNEC)

<table>
<thead>
<tr>
<th>Compartment</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marine water</td>
<td>0,00025 mg/l</td>
</tr>
</tbody>
</table>
8.2 Exposure controls

**Appropriate engineering controls**
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

**Personal protective equipment**

**Eye/face protection**
Tightly fitting safety goggles. Faceshield (8-inch minimum). Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

**Skin protection**
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove’s outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

The selected protective gloves have to satisfy the specifications of EU Directive 89/686/EEC and the standard EN 374 derived from it.

Full contact
Material: Fluorinated rubber
Minimum layer thickness: 0.7 mm
Break through time: 480 min
Material tested: Vitoject® (KCL 890 / Aldrich Z677698, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.2 mm
Break through time: 30 min
Material tested: Dermatril® P (KCL 743 / Aldrich Z677388, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

**Body Protection**
Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

**Respiratory protection**
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

**Control of environmental exposure**
Do not let product enter drains.

### SECTION 9: Physical and chemical properties

#### 9.1 Information on basic physical and chemical properties

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Fresh water</td>
<td>0,0025 mg/l</td>
</tr>
<tr>
<td>Marine sediment</td>
<td>0,002 mg/kg</td>
</tr>
<tr>
<td>Fresh water sediment</td>
<td>0,002 mg/kg</td>
</tr>
<tr>
<td>Onsite sewage treatment plant</td>
<td>8,8 mg/l</td>
</tr>
</tbody>
</table>

Aldrich - 339741
b) Odour No data available
c) Odour Threshold No data available
d) pH 1,2 at 5 g/l
e) Melting point/freezing point 3 °C
f) Initial boiling point and boiling range 290 °C - lit.
g) Flash point Not applicable
h) Evaporation rate No data available
i) Flammability (solid, gas) No data available
j) Upper/lower flammability or explosive limits No data available
k) Vapour pressure 1,33 hPa at 145,8 °C
l) Vapour density 3,39 - (Air = 1.0)
m) Relative density 1,84 g/cm3 at 25 °C
n) Water solubility soluble
o) Partition coefficient: n-octanol/water No data available
p) Auto-ignition temperature No data available
q) Decomposition temperature No data available
r) Viscosity No data available
s) Explosive properties No data available
t) Oxidizing properties No data available

9.2 Other safety information

Surface tension 55,1 mN/m at 20 °C
Relative vapour density 3,39 - (Air = 1.0)

SECTION 10: Stability and reactivity

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
No data available

10.5 Incompatible materials
Bases, Halides, Organic materials, Carbides, fulminates, Nitrates, picrates, Cyanides, Chlorates, alkali halides, Zinc salts, permanganates, e.g. potassium permanganate, Hydrogen peroxide, Azides, Perchlorates, Nitromethane, phosphorous, Reacts violently with; cyclopentadiene, cyclopentanone oxime, nitroaryl amines, hexalithium disilicide, phosphorous(III) oxide, Powdered metals

10.6 Hazardous decomposition products
Other decomposition products - No data available
SECTION 11: Toxicological information

11.1 Information on toxicological effects

**Acute toxicity**
LD50 Oral - Rat - 2.140 mg/kg
LC50 Inhalation - Rat - 2 h - 510 mg/m3

**Skin corrosion/irritation**
Skin - Rabbit
Result: Extremely corrosive and destructive to tissue.

**Serious eye damage/eye irritation**
Eyes - Rabbit
Result: Corrosive to eyes

**Respiratory or skin sensitisation**
No data available

**Germ cell mutagenicity**
No data available

**Carcinogenicity**
The International Agency for Research on Cancer (IARC) has determined that occupational exposure to strong-inorganic-acid mists containing sulfuric acid is carcinogenic to humans (group 1).

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

**Reproductive toxicity**
No data available

**Specific target organ toxicity - single exposure**
No data available

**Specific target organ toxicity - repeated exposure**
No data available

**Aspiration hazard**
No data available

**Additional Information**
RTECS: WS660000
Material is extremely destructive to tissue of the mucous membranes and upper respiratory tract, eyes, and skin., spasm, inflammation and edema of the larynx, spasm, inflammation and edema of the bronchi, pneumonitis, pulmonary edema, burning sensation, Cough, wheezing, laryngitis, Shortness of breath, Headache, Nausea, Vomiting, Pulmonary edema. Effects may be delayed., To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

SECTION 12: Ecological information

12.1 Toxicity

**Toxicity to fish**
LC50 - Gambusia affinis (Mosquito fish) - 42 mg/l - 96 h

**Toxicity to daphnia and other aquatic invertebrates**
EC50 - Daphnia magna (Water flea) - 29 mg/l - 24 h

12.2 Persistence and degradability
The methods for determining the biological degradability are not applicable to inorganic substances.

12.3 Bioaccumulative potential
No data available
12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

12.6 Other adverse effects

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product
Offer surplus and non-recyclable solutions to a licensed disposal company.

Contaminated packaging
Dispose of as unused product.

SECTION 14: Transport information

14.1 UN number
ADR/RID: 1830
IMDG: 1830
IATA: 1830

14.2 UN proper shipping name
ADR/RID: SULPHURIC ACID
IMDG: SULPHURIC ACID
IATA: Sulphuric acid

14.3 Transport hazard class(es)
ADR/RID: 8
IMDG: 8
IATA: 8

14.4 Packaging group
ADR/RID: II
IMDG: II
IATA: II

14.5 Environmental hazards
ADR/RID: no
IMDG Marine pollutant: no
IATA: no

14.6 Special precautions for user
No data available

SECTION 15: Regulatory information

This safety datasheet complies with the requirements of Regulation (EC) No. 1907/2006.

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture
No data available

15.2 Chemical Safety Assessment
A Chemical Safety Assessment has been carried out for this substance.

SECTION 16: Other information

Full text of H-Statements referred to under sections 2 and 3.

H290 May be corrosive to metals.
H314 Causes severe skin burns and eye damage.
Met. Corr. Corrosive to metals
Skin Corr. Skin corrosion

Full text of R-phrases referred to under sections 2 and 3

C Corrosive
R35 Causes severe burns.
Further information
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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.
SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers

Product name: Potassium hexacyanoferrate(III)

Product Number: 455946
Brand: Aldrich
REACH No.: A registration number is not available for this substance as the substance or its uses are exempted from registration, the annual tonnage does not require a registration or the registration is envisaged for a later registration deadline.

CAS-No.: 13746-66-2

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses: Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet

Company: Sigma-Aldrich Chemie GmbH
Riedstrasse 2
D-89555 STEINHEIM

Telephone: +49 89-6513-1444
Fax: +49 7329-97-2319
E-mail address: eurtechserv@sigma.com

1.4 Emergency telephone number

Emergency Phone #: 0800 181 7059 (CHEMTREC Deutschland)
+49 (0)696 43508409 (CHEMTREC weltweit)

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

Not a hazardous substance or mixture according to Regulation (EC) No. 1272/2008.

Classification according to EU Directives 67/548/EEC or 1999/45/EC
R32

For the full text of the R-phrases mentioned in this Section, see Section 16.

2.2 Label elements

Labelling according Regulation (EC) No 1272/2008
Pictogram: none
Signal word: none
Hazard statement(s): none
Precautionary statement(s): none
Supplemental Hazard information (EU)
EUH032 Contact with acids liberates very toxic gas.

2.3 Other hazards

Contact with acids liberates very toxic gas.
SECTION 3: Composition/information on ingredients

3.1 Substances
   Synonyms : Red prussiate
               Potassium ferricyanide
   Formula   : C₆Fe₅N₆
   Molecular Weight : 329.24 g/mol
   CAS-No.    : 13746-66-2
   EC-No.     : 237-323-3

   No components need to be disclosed according to the applicable regulations.

SECTION 4: First aid measures

4.1 Description of first aid measures
   General advice
   Consult a physician. Show this safety data sheet to the doctor in attendance.

   If inhaled
   If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

   In case of skin contact
   Wash off with soap and plenty of water. Consult a physician.

   In case of eye contact
   Flush eyes with water as a precaution.

   If swallowed
   Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
   The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
   no data available

SECTION 5: Firefighting measures

5.1 Extinguishing media
   Suitable extinguishing media
   Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
   Carbon oxides, nitrogen oxides (NOx), Potassium oxides, Iron oxides

5.3 Advice for firefighters
   Wear self contained breathing apparatus for fire fighting if necessary.

5.4 Further information
   no data available

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
   Use personal protective equipment. Avoid dust formation. Avoid breathing vapours, mist or gas. Avoid breathing dust.
   For personal protection see section 8.

6.2 Environmental precautions
   Do not let product enter drains.
6.3 Methods and materials for containment and cleaning up
Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed
collectors for disposal.

6.4 Reference to other sections
For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling
Avoid formation of dust and aerosols.
Provide appropriate exhaust ventilation at places where dust is formed.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Store in cool place. Keep container tightly closed in a dry and well-ventilated place.

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

SECTION 8: Exposure controls/personal protection

8.1 Control parameters
Components with workplace control parameters

8.2 Exposure controls
Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and
at the end of workday.

Personal protective equipment

Eye/face protection
Use equipment for eye protection tested and approved under appropriate government standards
such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique
(without touching glove’s outer surface) to avoid skin contact with this product. Dispose of
contaminated gloves after use in accordance with applicable laws and good laboratory practices.
Wash and dry hands.

The selected protective gloves have to satisfy the specifications of EU Directive 89/686/EEC and
the standard EN 374 derived from it.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0,11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0,11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de,
test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374,
contact the supplier of the CE approved gloves. This recommendation is advisory only and must
be evaluated by an industrial hygienist and safety officer familiar with the specific situation of
anticipated use by our customers. It should not be construed as offering an approval for any
specific use scenario.
Body Protection
Choose body protection in relation to its type, to the concentration and amount of dangerous substances, and to the specific work-place., The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Respiratory protection is not required. Where protection from nuisance levels of dusts are desired, use type N95 (US) or type P1 (EN 143) dust masks. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Do not let product enter drains.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a) Appearance Form: crystalline
b) Odour no data available
c) Odour Threshold no data available
d) pH 6.0 - 9 at 329 g/l at 25 °C
e) Melting point/freezing point no data available
f) Initial boiling point and boiling range no data available
g) Flash point no data available
h) Evaporation rate no data available
i) Flammability (solid, gas) no data available
j) Upper/lower flammability or explosive limits no data available
k) Vapour pressure no data available
l) Vapour density no data available
m) Relative density 1,890 g/cm3
n) Water solubility 329 g/l at 20 °C - completely soluble
o) Partition coefficient: n-octanol/water no data available
p) Auto-ignition temperature no data available
q) Decomposition temperature no data available
r) Viscosity no data available
s) Explosive properties no data available
t) Oxidizing properties no data available

9.2 Other safety information
no data available

SECTION 10: Stability and reactivity

10.1 Reactivity
Contact with acids liberates very toxic gas.
10.2 Chemical stability
May discolor on exposure to light.
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
no data available

10.4 Conditions to avoid
no data available

10.5 Incompatible materials
Strong acids, Strong oxidizing agents, Ammonia, hydrochloric acid, Cyanides

10.6 Hazardous decomposition products
Other decomposition products - no data available
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - mouse - 2.970 mg/kg

Skin corrosion/irritation
no data available

Serious eye damage/eye irritation
no data available

Respiratory or skin sensitisation
no data available

Germ cell mutagenicity
no data available

Carcinogenicity
IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

Reproductive toxicity
no data available

Specific target organ toxicity - single exposure
no data available

Specific target organ toxicity - repeated exposure
no data available

Aspiration hazard
no data available

Additional Information
RTECS: LJ8225000
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

SECTION 12: Ecological information

12.1 Toxicity

Toxicity to fish
LC50 - Oncorhynchus mykiss (rainbow trout) - 869 mg/l - 96 h

Toxicity to daphnia and other aquatic invertebrates
EC50 - Daphnia magna (Water flea) - 549 mg/l - 48 h
12.2 Persistence and degradability
no data available

12.3 Bioaccumulative potential
no data available

12.4 Mobility in soil
no data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects
no data available

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product
Offer surplus and non-recyclable solutions to a licensed disposal company. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Contaminated packaging
Dispose of as unused product.

SECTION 14: Transport information

14.1 UN number
ADR/RID: - IMDG: - IATA: -

14.2 UN proper shipping name
ADR/RID: Not dangerous goods IMDG: Not dangerous goods IATA: Not dangerous goods

14.3 Transport hazard class(es)
ADR/RID: - IMDG: - IATA: -

14.4 Packaging group
ADR/RID: IMDG: IATA: -

14.5 Environmental hazards
ADR/RID: no IMDG Marine pollutant: no IATA: no

14.6 Special precautions for user
no data available

SECTION 15: Regulatory information

This safety datasheet complies with the requirements of Regulation (EC) No. 1907/2006.

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture
no data available

15.2 Chemical Safety Assessment
For this product a chemical safety assessment was not carried out

SECTION 16: Other information

Full text of R-phrases referred to under sections 2 and 3

R32 Contact with acids liberates very toxic gas.
Further information
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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.
SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers
   Product name: Potassium chloride

   Product Number: P9333
   Brand: Sigma-Aldrich
   REACH No.: A registration number is not available for this substance as the substance
   or its uses are exempted from registration, the annual tonnage does not
   require a registration or the registration is envisaged for a later
   registration deadline.
   CAS-No.: 7447-40-7

1.2 Relevant identified uses of the substance or mixture and uses advised against

1.3 Details of the supplier of the safety data sheet
   Company: Sigma-Aldrich Chemie GmbH
   Riedstrasse 2
   D-89555 STEINHEIM
   Telephone: +49 89-6513-1444
   Fax: +49 7329-97-2319
   E-mail address: eurtechserv@sial.com

1.4 Emergency telephone number
   Emergency Phone #: 0800 181 7059 (CHEMTREC Deutschland)
   +49 (0)696 43508409 (CHEMTREC weltweit)

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture
   Not a hazardous substance or mixture according to Regulation (EC) No. 1272/2008.
   This substance is not classified as dangerous according to Directive 67/548/EEC.

2.2 Label elements
   The product does not need to be labelled in accordance with EC directives or respective national laws.

2.3 Other hazards
   This substance/mixture contains no components considered to be either persistent, bioaccumulative and
   toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

SECTION 3: Composition/information on ingredients

3.1 Substances
   Formula: KCI
   Molecular weight: 74.55 g/mol
   CAS-No.: 7447-40-7
   EC-No.: 231-211-8

   No components need to be disclosed according to the applicable regulations.
SECTION 4: First aid measures

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
Hydrogen chloride gas, Potassium oxides

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
No data available

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
Use personal protective equipment. Avoid dust formation. Avoid breathing vapours, mist or gas. Avoid breathing dust.
For personal protection see section 8.

6.2 Environmental precautions
Do not let product enter drains.

6.3 Methods and materials for containment and cleaning up
Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling
Avoid formation of dust and aerosols.
Provide appropriate exhaust ventilation at places where dust is formed.
For precautions see section 2.2.
7.2  **Conditions for safe storage, including any incompatibilities**
Store in cool place. Keep container tightly closed in a dry and well-ventilated place.

Hygroscopic
Storage class (TRGS 510): Non Combustible Solids

7.3  **Specific end use(s)**
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

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**SECTION 8: Exposure controls/personal protection**

8.1  **Control parameters**

8.2  **Exposure controls**

**Appropriate engineering controls**
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

**Personal protective equipment**

**Eye/face protection**
Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

**Skin protection**
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

The selected protective gloves have to satisfy the specifications of EU Directive 89/686/EEC and the standard EN 374 derived from it.

**Full contact**
Material: Nitrile rubber
Minimum layer thickness: 0,11 mm
Break through time: 480 min
Material tested: Dermatril® (KCL 740 / Aldrich Z677272, Size M)

**Splash contact**
Material: Nitrile rubber
Minimum layer thickness: 0,11 mm
Break through time: 480 min
Material tested: Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

**Body Protection**
Choose body protection in relation to its type, to the concentration and amount of dangerous substances, and to the specific work-place., The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

**Respiratory protection**
Respiratory protection is not required. Where protection from nuisance levels of dusts are desired, use type N95 (US) or type P1 (EN 143) dust masks. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).
Control of environmental exposure
Do not let product enter drains.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a) Appearance
   Form: crystalline, powder
   Colour: white

b) Odour
   No data available

c) Odour Threshold
   No data available

d) pH
   7

e) Melting point/freezing point
   Melting point/range: 770 °C

f) Initial boiling point and boiling range
   1.500 °C

g) Flash point
   No data available

h) Evaporation rate
   No data available

i) Flammability (solid, gas)
   No data available

j) Upper/lower flammability or explosive limits
   No data available

k) Vapour pressure
   No data available

l) Vapour density
   No data available

m) Relative density
   1.98 g/mL at 25 °C

n) Water solubility
   soluble

o) Partition coefficient: n-octanol/water
   No data available

p) Auto-ignition temperature
   No data available

q) Decomposition temperature
   No data available

r) Viscosity
   No data available

s) Explosive properties
   No data available

t) Oxidizing properties
   No data available

9.2 Other safety information
   No data available

SECTION 10: Stability and reactivity

10.1 Reactivity
   No data available

10.2 Chemical stability
   Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
   No data available

10.4 Conditions to avoid
   Exposure to moisture.
10.5 **Incompatible materials**
Strong acids, Strong oxidizing agents

10.6 **Hazardous decomposition products**
Other decomposition products - No data available
In the event of fire: see section 5

**SECTION 11: Toxicological information**

11.1 **Information on toxicological effects**

**Acute toxicity**
No data available

**Skin corrosion/irritation**
No data available

**Serious eye damage/eye irritation**
No eye irritation

**Respiratory or skin sensitisation**
No data available

**Germ cell mutagenicity**
No data available

**Carcinogenicity**
IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

**Reproductive toxicity**
No data available

**Specific target organ toxicity - single exposure**
No data available

**Specific target organ toxicity - repeated exposure**
No data available

**Aspiration hazard**
No data available

**Additional Information**
RTECS: TS8050000
hyperkalemia, Nausea, Vomiting, Abdominal pain, Diarrhoea, Constipation., Paresthesia., Thirst, Dizziness, Rash, pruritus, Weakness, muscle cramps, minor psychiatric changes, minor visual changes

**SECTION 12: Ecological information**

12.1 **Toxicity**

**Toxicity to fish**
LC50 - Pimephales promelas (fathead minnow) - 880 mg/l - 96 h
mortality NOEC - Pimephales promelas (fathead minnow) - 500 mg/l - 7 d
mortality LOEC - Pimephales promelas (fathead minnow) - 1.000 mg/l - 7 d

**Toxicity to daphnia and other aquatic invertebrates**
EC50 - Daphnia magna (Water flea) - > 440 mg/l - 48 h
(OECD Test Guideline 202)

12.2 **Persistence and degradability**
No data available

12.3 **Bioaccumulative potential**
No data available
12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

12.6 Other adverse effects

SECTION 13: Disposal considerations

13.1 Waste treatment methods
Product
Offer surplus and non-recyclable solutions to a licensed disposal company. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Contaminated packaging
Dispose of as unused product.

SECTION 14: Transport information

14.1 UN number
ADR/RID: - IMDG: - IATA: -

14.2 UN proper shipping name
ADR/RID: Not dangerous goods IMDG: Not dangerous goods IATA: Not dangerous goods

14.3 Transport hazard class(es)
ADR/RID: - IMDG: - IATA: -

14.4 Packaging group
ADR/RID: - IMDG: - IATA: -

14.5 Environmental hazards
ADR/RID: no IMDG Marine pollutant: no IATA: no

14.6 Special precautions for user
No data available

SECTION 15: Regulatory information
This safety datasheet complies with the requirements of Regulation (EC) No. 1907/2006.

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture
No data available

15.2 Chemical Safety Assessment
For this product a chemical safety assessment was not carried out

SECTION 16: Other information

Further information
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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.
SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers

Product name: Calcium chloride solution ~1 M in H2O

Product Number: 21115
Brand: Sigma
REACH No.: A registration number is not available for this substance as the substance or its uses are exempted from registration, the annual tonnage does not require a registration or the registration is envisaged for a later registration deadline.

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses: Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet

Company: Sigma-Aldrich Chemie GmbH
Riedstrasse 2
D-89555 STEINHEIM

Telephone: +49 89-6513-1444
Fax: +49 7329-97-2319
E-mail address: eurtechserv@sial.com

1.4 Emergency telephone number

Emergency Phone #: 0800 181 7059 (CHEMTREC Deutschland)
+49 (0)696 43508409 (CHEMTREC weltweit)

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

Classification according to Regulation (EC) No 1272/2008

Eye irritation (Category 2), H319

For the full text of the H-Statements mentioned in this Section, see Section 16. Not a hazardous substance or mixture according to EC-directives 67/548/EEC or 1999/45/EC.

2.2 Label elements

Labelling according Regulation (EC) No 1272/2008

Pictogram: !

Signal word: Warning

Hazard statement(s):
H319 Causes serious eye irritation.

Precautionary statement(s):
P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

Supplemental Hazard Statements: none
Hazard symbol(s) none
R-phrase(s) none
S-phrase(s) none
Safety data sheet available on request for professional users.

2.3 Other hazards - none

SECTION 3: Composition/information on ingredients

3.2 Mixtures
Chemical characterization : Natural product
Formula : CaCl₂
Molecular Weight : 110,98 g/mol

Hazardous ingredients according to Regulation (EC) No 1272/2008

<table>
<thead>
<tr>
<th>Component</th>
<th>Classification</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calcium chloride</td>
<td>Eye Irrit. 2; H319</td>
<td>10 - 20 %</td>
</tr>
<tr>
<td>CAS-No.</td>
<td>10043-52-4</td>
<td></td>
</tr>
<tr>
<td>EC-No.</td>
<td>233-140-8</td>
<td></td>
</tr>
<tr>
<td>Index-No.</td>
<td>017-013-00-2</td>
<td></td>
</tr>
</tbody>
</table>

Hazardous ingredients according to Directive 1999/45/EC

<table>
<thead>
<tr>
<th>Component</th>
<th>Classification</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calcium chloride</td>
<td>Xi, R36</td>
<td>10 - 20 %</td>
</tr>
<tr>
<td>CAS-No.</td>
<td>10043-52-4</td>
<td></td>
</tr>
<tr>
<td>EC-No.</td>
<td>233-140-8</td>
<td></td>
</tr>
<tr>
<td>Index-No.</td>
<td>017-013-00-2</td>
<td></td>
</tr>
</tbody>
</table>

For the full text of the H-Statements and R-Phrases mentioned in this Section, see Section 16

SECTION 4: First aid measures

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
no data available

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.
5.2 Special hazards arising from the substance or mixture
Hydrogen chloride gas, Calcium oxide

5.3 Advice for firefighters
Wear self contained breathing apparatus for fire fighting if necessary.

5.4 Further information
no data available

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
Use personal protective equipment. Avoid breathing vapours, mist or gas. Ensure adequate ventilation.
Evacuate personnel to safe areas.
For personal protection see section 8.

6.2 Environmental precautions
Do not let product enter drains.

6.3 Methods and materials for containment and cleaning up
Soak up with inert absorbent material and dispose of as hazardous waste. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling
Avoid inhalation of vapour or mist.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Store in cool place. Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.

7.3 Specific end use(s)
A part from the uses mentioned in section 1.2 no other specific uses are stipulated

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Components with workplace control parameters

8.2 Exposure controls

Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection
Tightly fitting safety goggles. Faceshield (8-inch minimum). Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove’s outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.
The selected protective gloves have to satisfy the specifications of EU Directive 89/686/EEC and the standard EN 374 derived from it.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested: Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested: Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de,
test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374,
contact the supplier of the CE approved gloves. This recommendation is advisory only and must
be evaluated by an industrial hygienist and safety officer familiar with the specific situation of
anticipated use by our customers. It should not be construed as offering an approval for any
specific use scenario.

**Body Protection**
Complete suit protecting against chemicals, The type of protective equipment must be selected
according to the concentration and amount of the dangerous substance at the specific workplace.

**Respiratory protection**
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator
with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup
to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air
respirator. Use respirators and components tested and approved under appropriate government
standards such as NIOSH (US) or CEN (EU).

**Control of environmental exposure**
Do not let product enter drains.

---

**SECTION 9: Physical and chemical properties**

**9.1 Information on basic physical and chemical properties**

- **a) Appearance**
  - Form: liquid
  - Colour: colourless

- **b) Odour**
  - no data available

- **c) Odour Threshold**
  - no data available

- **d) pH**
  - 6.0 - 8.0 at 25 °C

- **e) Melting point/freezing point**
  - 0.0 °C

- **f) Initial boiling point and boiling range**
  - 100.0 °C

- **g) Flash point**
  - no data available

- **h) Evaporation rate**
  - no data available

- **i) Flammability (solid, gas)**
  - no data available

- **j) Upper/lower flammability or explosive limits**
  - no data available

- **k) Vapour pressure**
  - no data available

- **l) Vapour density**
  - no data available

- **m) Relative density**
  - 1.086 g/mL at 20 °C

- **n) Water solubility**
  - completely miscible

- **o) Partition coefficient: n-octanol/water**
  - no data available
9.2 Other safety information
no data available

SECTION 10: Stability and reactivity

10.1 Reactivity
no data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
no data available

10.4 Conditions to avoid
no data available

10.5 Incompatible materials
Strong oxidizing agents

10.6 Hazardous decomposition products
Other decomposition products - no data available
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
no data available

Skin corrosion/irritation
no data available

Serious eye damage/eye irritation
no data available

Respiratory or skin sensitisation
no data available

Germ cell mutagenicity
no data available

Carcinogenicity
IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

Reproductive toxicity
no data available

Specific target organ toxicity - single exposure
no data available

Specific target organ toxicity - repeated exposure
no data available

Aspiration hazard
no data available
Additional Information
RTECS: Not available
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

SECTION 12: Ecological information
12.1 Toxicity
no data available
12.2 Persistence and degradability
no data available
12.3 Bioaccumulative potential
no data available
12.4 Mobility in soil
no data available
12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted
12.6 Other adverse effects
no data available

SECTION 13: Disposal considerations
13.1 Waste treatment methods
Product
Offer surplus and non-recyclable solutions to a licensed disposal company.
Contaminated packaging
Dispose of as unused product.

SECTION 14: Transport information
14.1 UN number
ADR/RID: - IMDG: - IATA: -
14.2 UN proper shipping name
ADR/RID: Not dangerous goods IMDG: Not dangerous goods IATA: Not dangerous goods
14.3 Transport hazard class(es)
ADR/RID: - IMDG: - IATA: -
14.4 Packaging group
ADR/RID: - IMDG: - IATA: -
14.5 Environmental hazards
ADR/RID: no IMDG Marine pollutant: no IATA: no
14.6 Special precautions for user
no data available

SECTION 15: Regulatory information
This safety datasheet complies with the requirements of Regulation (EC) No. 1907/2006.
15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture
no data available
15.2 Chemical Safety Assessment
For this product a chemical safety assessment was not carried out
SECTION 16: Other information

Full text of H-Statements referred to under sections 2 and 3.

Eye Irrit.      Eye irritation
H319          Causes serious eye irritation.

Full text of R-phrases referred to under sections 2 and 3

Xi           Irritant
R36          Irritating to eyes.

Further information

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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.
**SECTION 1: Identification of the substance/mixture and of the company/undertaking**

1.1 **Product identifiers**
   - **Product name**: Gum rosin
   - **Product Number**: 60895
   - **Brand**: Aldrich
   - **Index-No.**: 650-015-00-7
   - **REACH No.**: A registration number is not available for this substance as the substance or its uses are exempted from registration, the annual tonnage does not require a registration or the registration is envisaged for a later registration deadline.
   - **CAS-No.**: 8050-09-7

1.2 **Relevant identified uses of the substance or mixture and uses advised against**
   - **Identified uses**: Laboratory chemicals, Manufacture of substances

1.3 **Details of the supplier of the safety data sheet**
   - **Company**: Sigma-Aldrich Chemie GmbH
     - Riedstrasse 2
     - D-89555 STEINHEIM
   - **Telephone**: +49 89-6513-1444
   - **Fax**: +49 7329-97-2319
   - **E-mail address**: eurtechserv@sial.com

1.4 **Emergency telephone number**
   - **Emergency Phone #**: 0800 181 7059 (CHEMTREC Deutschland)
     +49 (0)696 43508409 (CHEMTREC weltweit)

**SECTION 2: Hazards identification**

2.1 **Classification of the substance or mixture**
   - **Classification according to Regulation (EC) No 1272/2008**
     - Skin sensitisation (Category 1), H317
   - For the full text of the H-Statements mentioned in this Section, see Section 16.
   - **Classification according to EU Directives 67/548/EEC or 1999/45/EC**
     - R43
   - For the full text of the R-phrases mentioned in this Section, see Section 16.

2.2 **Label elements**
   - **Labelling according Regulation (EC) No 1272/2008**
     - **Pictogram**: !
     - **Signal word**: Warning
     - **Hazard statement(s)**: May cause an allergic skin reaction.
Precautionary statement(s)
P280 Wear protective gloves.

Supplemental Hazard none

2.3 Other hazards - none

SECTION 3: Composition/information on ingredients

3.1 Substances
Synonyms: Colophony, Rosin, gum

Molecular weight: 302 g/mol
CAS-No.: 8050-09-7
EC-No.: 232-475-7
Index-No.: 650-015-00-7

Hazardous ingredients according to Regulation (EC) No 1272/2008

<table>
<thead>
<tr>
<th>Component</th>
<th>Classification</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Colophony</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CAS-No.</td>
<td>8050-09-7</td>
<td>Skin Sens. 1; H317 &lt;= 100 %</td>
</tr>
<tr>
<td>EC-No.</td>
<td>232-475-7</td>
<td></td>
</tr>
<tr>
<td>Index-No.</td>
<td>650-015-00-7</td>
<td></td>
</tr>
</tbody>
</table>

Hazardous ingredients according to Directive 1999/45/EC

<table>
<thead>
<tr>
<th>Component</th>
<th>Classification</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Colophony</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CAS-No.</td>
<td>8050-09-7</td>
<td>Xi, R43 &lt;= 100 %</td>
</tr>
<tr>
<td>EC-No.</td>
<td>232-475-7</td>
<td></td>
</tr>
<tr>
<td>Index-No.</td>
<td>650-015-00-7</td>
<td></td>
</tr>
</tbody>
</table>

For the full text of the H-Statements and R-Phrases mentioned in this Section, see Section 16

SECTION 4: First aid measures

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available
SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
Nature of decomposition products not known.

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
No data available

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
Use personal protective equipment. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Avoid breathing dust. For personal protection see section 8.

6.2 Environmental precautions
Do not let product enter drains.

6.3 Methods and materials for containment and cleaning up
Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid formation of dust and aerosols. Provide appropriate exhaust ventilation at places where dust is formed. For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Store in cool place. Keep container tightly closed in a dry and well-ventilated place.

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

SECTION 8: Exposure controls/personal protection

8.1 Control parameters
Components with workplace control parameters

8.2 Exposure controls

Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of
contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

The selected protective gloves have to satisfy the specifications of EU Directive 89/686/EEC and the standard EN 374 derived from it.

**Full contact**
Material: Nitrile rubber
Minimum layer thickness: 0,11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

**Splash contact**
Material: Nitrile rubber
Minimum layer thickness: 0,11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

**Body Protection**
Complete suit protecting against chemicals. The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

**Respiratory protection**
For nuisance exposures use type P95 (US) or type P1 (EU EN 143) particle respirator. For higher level protection use type OV/AG/P99 (US) or type ABEK-P2 (EU EN 143) respirator cartridges. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

**Control of environmental exposure**
Do not let product enter drains.

---

**SECTION 9: Physical and chemical properties**

**9.1 Information on basic physical and chemical properties**

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>a) Appearance</strong></td>
<td>Form: Solidified mass or fragments</td>
</tr>
<tr>
<td></td>
<td>Colour: dark yellow</td>
</tr>
<tr>
<td><strong>b) Odour</strong></td>
<td>No data available</td>
</tr>
<tr>
<td><strong>c) Odour Threshold</strong></td>
<td>No data available</td>
</tr>
<tr>
<td><strong>d) pH</strong></td>
<td>No data available</td>
</tr>
<tr>
<td><strong>e) Melting point/freezing point</strong></td>
<td>Melting point/range: 66,5 - 93,4 °C at ca.1.013,0 hPa</td>
</tr>
<tr>
<td><strong>f) Initial boiling point and boiling range</strong></td>
<td>No data available</td>
</tr>
<tr>
<td><strong>g) Flash point</strong></td>
<td>188 °C - closed cup</td>
</tr>
<tr>
<td><strong>h) Evaporation rate</strong></td>
<td>No data available</td>
</tr>
<tr>
<td><strong>i) Flammability (solid, gas)</strong></td>
<td>No data available</td>
</tr>
<tr>
<td><strong>j) Upper/lower flammability or explosive limits</strong></td>
<td>No data available</td>
</tr>
<tr>
<td><strong>k) Vapour pressure</strong></td>
<td>0,06 hPa at ca.20 °C</td>
</tr>
</tbody>
</table>
9.2 Other safety information
No data available

SECTION 10: Stability and reactivity

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
No data available

10.5 Incompatible materials
Strong oxidizing agents

10.6 Hazardous decomposition products
Other decomposition products - No data available
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - male and female - 2.800 mg/kg
LD50 Dermal - Rat - male and female - > 2.000 mg/kg
(OECD Test Guideline 402)

Skin corrosion/irritation
Skin - Rabbit
Result: No skin irritation - 4 h
(OECD Test Guideline 404)

Serious eye damage/eye irritation
Eyes - Rabbit
Result: No eye irritation
(OECD Test Guideline 405)

Respiratory or skin sensitisation
No data available
Germ cell mutagenicity
Ames test
S. typhimurium
Result: negative

Carcinogenicity
IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

Reproductive toxicity
No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

Additional Information
RTECS: VL0480000
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

SECTION 12: Ecological information

12.1 Toxicity
Toxicity to fish static test LC50 - Brachydanio rerio (zebrafish) - 60,3 mg/l - 96 h (OECD Test Guideline 203)

12.2 Persistence and degradability
Biodegradability aerobic - Exposure time 28 d
Result: 58 % - Not readily biodegradable.
(OECD Test Guideline 301B)

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects
No data available

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product
Offer surplus and non-recyclable solutions to a licensed disposal company. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Contaminated packaging
Dispose of as unused product.

SECTION 14: Transport information

14.1 UN number
ADR/RID: -
IMDG: -
IATA: -
### 14.2 UN proper shipping name
ADR/RID: Not dangerous goods  
IMDG: Not dangerous goods  
IATA: Not dangerous goods

<table>
<thead>
<tr>
<th>14.3 Transport hazard class(es)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADR/RID: -</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>14.4 Packaging group</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADR/RID: -</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>14.5 Environmental hazards</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADR/RID: no</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>14.6 Special precautions for user</th>
</tr>
</thead>
<tbody>
<tr>
<td>No data available</td>
</tr>
</tbody>
</table>

### SECTION 15: Regulatory information
This safety datasheet complies with the requirements of Regulation (EC) No. 1907/2006.

#### 15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture
No data available

#### 15.2 Chemical Safety Assessment
For this product a chemical safety assessment was not carried out

### SECTION 16: Other information
**Full text of H-Statements referred to under sections 2 and 3.**

- **H317** May cause an allergic skin reaction.  
  Skin Sens. Skin sensitisation

**Full text of R-phrases referred to under sections 2 and 3**

- **Xi** Irritant  
- **R43** May cause sensitisation by skin contact.

**Further information**
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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.
VORONEZHSYNTHEZKAUCHUK JSC

SAFETY DATA SHEET
According to 1 907/2006/EC, article 31 (REACH)

BUTADIENE RUBBER (BR)
GRADE SKD-Nd, BR -1243 Nd
(polybutadiene, solution)

SECTION 1. IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND COMPANY/UNDERTAKING

1.1 Product identifier
Name of Substance: Cis-(poly)butadiene
Name of IUPAC butadiene- 1,3 polymer
Synonyms cis- 1 ,4-(poly)butadiene;
Polybutadiene (cis);
1.3-Butadiene, homopolymer
TRADE NAMES: Butadiene Rubber (BR)
PRODUCT GRADES BR -1243 Nd
Registration #: for 1.3-butadiene
(CAS #106-99-0; EC #203-450-8)
Index No(CL):601-013-00-X

1.2 Relevant identified uses of the substance
Most common technical function of cis-(poly)butadiene: tyre production, technical rubber parts (profiles, hoses, shoe soles, belt production, technical rubber goods), rubber compound.

DISCLAIMER
This product is a polymer and is not classified as dangerous under criteria of Directives No 6714581EEC, No 19991451EC and Regulation (EC) No 127212008 (Regulation CLP). This polymer does not contain substances classified as dangerous under Article 59.2 Regulation (EC) No 1272/2008, namely:
- in an individual concentration of? 1 % by weight for non-gaseous mixtures posing human health or environmental; or
- in an individual concentration of? 0.1 % by weight for non-gaseous mixtures that is carcinogenic category 2 or toxic to reproduction category JA, IB and 2, skin sensitiiser category 1, respiratory sensitiiser category 1, or has effects on or via lactation or is persistent, bioaccumulative and toxic (PBT) in accordance with the criteria set out in Annex XIII or very persistent and very bioaccumulative (vPvB) in accordance with the criteria set out in Annex XIII; or
- a substance for which there are Community workplace exposure limits.
In accordance with mentioned above, this product does not require and official e-SDS as per Regulations (EC) No 190712006 (articles 31.1; 31.2) and Commission Regulation (EU) No 45312010.
This e-SDS is developed in good faith to provide a customer with sufficient information allowing to take necessary measures to comply with relevant HSE requirements.
1.3 Details of the supplier of the safety data sheet

**Only representative**
Company name: Gazprom Marketing and Trading France
Address: 68 avenue des Champs-Elysées, 75008, Paris, France
Contact Telephone: +33 14 29 97350
Fax: +33 142 99 73 99

**Suppliers**
Company name: Voronezhsynthezkauchuk JSC
Address: 2, Leninsky avenue, Voronezh, Russian Federation, 394014
Phone: +7 4732 20-65-26
Emergency phone: +7 4732 20-67-40

**Emergency phone in the 112** (Please note that emergency numbers may vary depending upon the country of delivery though 112 remains valid as universal number)

SECTION 2. HAZARDS IDENTIFICATION

**Classification:**
ANNEX I OF DIRECTIVE 67/548/EEC
Physical/Chemical Hazards: None.
Health Hazards: None.
Environmental hazards: None.

EU CLP 2008
Physical / Chemical Hazards: None.
Health Hazards: None.
Environmental hazards: None.

**Specific hazard:**
No significant health hazard in normal industrial use conditions.
Contact of melted/ heated product may cause thermal burns.
Processing vapours, which can irritate eyes and respiratory tract, may form when product is heated at high temperatures.
Combustible solid.
SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

This product is a synthetic rubber consisting of at least 98.5% polymerised 1.3-butadiene and antioxidants (CAS#128-37-0 /EC#204-881-4 or CAS#1 19-47-1/ EC# 204-327-1 or CAS#1 10553-27-0/ EC#402-860-6).

Formula: (-CH2-CH=CH-CH2-)

<table>
<thead>
<tr>
<th>Component</th>
<th>Conc. %</th>
<th>CAS / EC #</th>
<th>Classification EC# 67/548/EEC and EC#1 272/2008 (CLP)</th>
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</thead>
<tbody>
<tr>
<td>Cis-(poly)butadiene</td>
<td>≥98.5</td>
<td>9003-17-2/</td>
<td>none</td>
</tr>
</tbody>
</table>

The product does not contain impurities or additives that could affect product's labelling and classification according to Regulation (EC) No 67/548/EEC and Regulation (EC) No 1272/2008 (CLP) in the concentration ranges specified.

SECTION 4. FIRST-AID MEASURES

General information:
Spontaneous penetration of butadiene rubber into human organism is impossible.
If heated over 300 °C rubber thermo destruction is possible.
Butadiene rubber is a stable product under normal conditions. Non-volatile, causes non-exhaustive effects. Inhalation poisoning is unlikely.
Contact with eyes may cause mechanical damage.
Contact with skin has no effects.

Inhalation:
Move any exposed person to fresh air at once. Keep warm and at rest. If there is respiratory distress give oxygen. If respiration stops or shows signs of failing, apply artificial respiration. Get medical attention.

Ingestion:
Wash out mouth with water and give plenty of water to drink, provided person is conscious. Do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If vomiting occurs naturally, have the exposed person lean forward. Get medical aid.

Skin contact:
Remove contaminated clothing and wash skin with plenty of running water, under a shower if affected area is large enough to warrant this. Get medical attention.

Eye contact:
Rinse immediately eye with plenty of low pressure water for at least 15 minutes.
Remove any contact lenses. Get medical attention.

SECTION 5. FIRE-FIGHTING MEASURES

Extinguishing media:
The substance is combustible. Use foam, dry chemical, carbon dioxide, or water spray.
Special fire fighting procedures:
Keep away from sources of ignition - no smoking.

Unusual fire & explosion hazards:
None.

Specific hazards:
Combustion generates irritating and toxic fumes.

Protective measures in fire:
Wear full protective clothing and MSHA/NIOSH-approved self-contained breathing apparatus with full face piece operated in the pressure demand or other positive pressure mode.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Personal precautions:
See section 8.

Environmental precautions:
Take precautionary measures against discharges into the environment.

Spill clean up methods:
Sweep spilled substance into containers. Avoid generating dusty conditions and provide ventilation. All equipment must be grounded.

SECTION 7. HANDLING AND STORAGE

Usage precaution:
Wash thoroughly after handling. Avoid contact with eyes and skin. Do not ingest or inhale. Minimise dust generation and accumulation. Remove all sources of ignition. All equipment must be grounded.

Storage precautions:
Store in a cool, dry, well-ventilated area away from direct sunlight and incompatible substances in a closed container. Keep away from source of open fire.

SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Exposure limits:
None listed.

Protective equipment:
Protective gloves, safety goggles and protective clothing.

Respiratory equipment: Wear positive pressure self-contained breathing apparatus if warranted by workplace conditions.

Hand protection:
Wear approved protective gloves.

Eye protection:
Wear approved safety goggles.
Hygiene measures:
Wash at the end of each work shift and before eating, drinking, smoking or using the toilet.

Skin protection:
Wear protective clothing.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

- **Appearance**
  elastic solid (briquette)
- **Colour**
  light brown to dark-brown
- **Odour**
  peculiar
- **pH value**
  not applicable, insoluble in water
- **Melting point**
  above 160 °C
- **Decomposition temperature**
  above 300 °C
- **Glass transition temperature**
  102 °C 332°C 292
- **Auto-ignition temperature**
  °C 0.910-0.930
- **Ignition temperature**
  "g/cm³"
- **Specific Gravity**
  insoluble in water
- **Solubility**
  soluble in hexane, toluene, benzene, chloroform, tetrachloride carbon
  non explosive

Explosive properties
not applicable, substance is not marketed or used in granular form.

SECTION 10. STABILITY AND REACTIVITY

**Stability:**
Stable under normal temperatures and pressures.

**Materials to avoid:**
Strong acids, alkalis, strong oxidising agents, organic solvents.

**Conditions to avoid:**
High temperature, oxygen, ozone, naked flame, sparks, long exposure to sunlight, contact with incompatible materials.

**Hazardous decomposition products:**
Carbon monoxide, carbon dioxide.

SECTION 11. TOXICOLOGICAL INFORMATION

**General:**
C is-(poly)butadiene:
LD 50 (oral, rat): 20000 mg/kg (Russian Register of Potentially Hazardous Chemical and Biological Substances /FBEPH)

**Inhalation:**
Cis-(poly)butadiene has no local irritating effect on the gastrointestinal tract when inhaled, conjunctiva, skin-resorptive and sensitizing effect.

Ingestion:
Not applicable.

**Skin contact:**
There is no irritant effect on skin.

Eye contact:
There is no irritant effect on eyes.

**SECTION 12. ECOLOGICAL INFORMATION**

**Aquatic toxicity:**
Cis-(poly)butadiene (Russian Register of Potentially Hazardous Chemical and Biological Substances /FBEPH):

- LC50 (96 h): >100 mg/L (*Oncorhynchus mykiss*)
- LC50 (48 h): >100 mg/L (*Daphnia Magna*)
- LC50 (48 h): >100 mg/L (*Algae*)

**Ecotoxicity:**
The product is poorly biodegradable but does not pose a hazard to the environment.

Water hazard classification:
According to the German VwVwS: WGK- I (low danger for water pollution).

**SECTION 13. DISPOSAL CONSIDERATIONS**

**General information:**
Place into a suitable closed container for disposal.

Disposal methods:
Dispose of in accordance with local and national regulations.

**SECTION 14. TRANSPORT INFORMATION**

**General:**
The product is not covered by international regulations on the transport of dangerous goods.

UN: none.
SECTION 15. REGULATORY INFORMATION

REGULATORY

Chemical Safety Report has been performed for monomer: 1,3-butadiene (CAS #106-99-0; EC #203-450-8) (CAS #106-99-0; EC #203-450-8).

SECTION 16. OTHER INFORMATION

16.1 Indication of changes

<table>
<thead>
<tr>
<th>VERSION I Date of change</th>
<th>Section I Description of Changes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Version: 1.0 05/03/2010</td>
<td>First edition created according to recommendations of Regulations (EC) # 1 9 0 7 / 2 0 0 6 (A r t i c l e 3 1 . 1 ).</td>
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<tr>
<td>Version: 2.0 07/02/2011</td>
<td>1.1,2 Section 1.111.2 was updated</td>
</tr>
<tr>
<td>Version: 2.1 26/12/2011</td>
<td>1.1;3; 1 Product name BR SKD-ND was renamed into BR -1243 Nd.</td>
</tr>
<tr>
<td></td>
<td>4; 9; 10; 2. Section 1.1 was updated.</td>
</tr>
<tr>
<td></td>
<td>15; 16 3. DISCLAIMER was added on the first page.</td>
</tr>
<tr>
<td></td>
<td>4. &quot;General information&quot; subsection was added in Section 4.</td>
</tr>
<tr>
<td></td>
<td>5.&quot;Aquatic toxicity&quot; subsection was added in Section 12.</td>
</tr>
<tr>
<td></td>
<td>7. Sections 3, 9, 10; 15, 16 were fully updated.</td>
</tr>
</tbody>
</table>

16.2 Relevant R-phrases, Hazard- and EU Hazard-statements

Labelling: none.

R-phrases: none.

Safety Advice (S-phrases):

S16 Keep away from sources of ignition - no smoking
S41 In case of fire and/or explosion do not breathe fumes
S47 Keep at temperature not exceeding 30°C

16.3 Abbreviations and acronyms

LD50 Lethal Dose to 50% of a test population (Median Lethal Dose)
LC50 Lethal Concentration to 50% of a test population
PBT Persistent, bioaccumulative, toxic chemical
vPvB Very Persistent, Very Bioaccumulative
UN United Nations
WGK Wassergefährdungsklasse (German: Water Hazard Class)

16.4 Key literature references and sources

EU DIRECTIVES


NATIONAL REGULATIONS (GERMANY)
Major Accident Hazard Legislation 82/501/EWG.


**DISCLAIMER**

This information is based on our current level of knowledge. This information may be subject to revision as new knowledge and experience becomes available, and SIBUR makes no warranties and assumes no liability in connection with any use of this information. Since SIBUR cannot be aware of all aspects of your business and the impact the REACH Regulation has for your company, SIBUR strongly encourages you to get familiar with the REACH Regulation in order to comply with its requirements and timelines.
MATERIAL SAFETY DATA SHEET
STANDARD MALAYSIAN RUBBER (SMR)

Ref: HO-SMR/27.09.07
(Replaces Ref: HO140798-271202 & Ref: HO/CV140798-271202)

1. **Company Name**: REGIONAL RUBBER TRADING CO. PTE LTD.
   65, Chulla Street, # 44 - 01,
   OCBC Centre,
   Singapore 049513.

   **Products Information**: Tel. No. 65 - 65354055
   Fax No. 65 - 65337341

   **Emergency Information**: Production Factory & Code
                              Telephone Number
                              Kota Trading, Batu Pahat (FU) 607 - 4319900
                              Kota Trading, Tampin (DR) 606 - 4381052
                              Lee Rubber, Bentung (BT) 609 - 2233883
                              Lee Rubber, Bukit Mertajam (CE) 604 - 5213033
                              Lee Rubber, Klang (GL) 603 - 33424611
                              Lee Rubber, Kuala Kangsar (CI) 605 - 7761545
                              Lee Rubber, Kuala Krai (BP1) 609 - 9606618
                              Lee Rubber, Labis (BQ) 607 - 9256211
                              Lee Rubber, Muar (EW) 606 - 9556552
                              Lee Rubber, Penang (EM) 604 - 8286148
                              Lee Rubber, Tanah Merah (BP) 609 - 9556164

   **Product Name**: STANDARD MALAYSIAN RUBBER

<table>
<thead>
<tr>
<th>SMR 5</th>
<th>SMR 10</th>
<th>SMR 20</th>
</tr>
</thead>
<tbody>
<tr>
<td>SMR GP</td>
<td>SMR 10CV</td>
<td>SMR 20CV</td>
</tr>
</tbody>
</table>

2. **Composition / Information of Ingredients**

   Raw natural rubber consists essentially about 95% of the hydrocarbon/
   'cis - polyisoprene' together with small amount of other naturally occurring substances
   such as lipids (1.6%), inositols & carbohydrates (1.6%), proteinous substances (1.4%),
   ash (0.5%), proteinous and nitrogen compound (0.3%).

   For 10CV, 20CV and GP grades, they contain very small amount of added substances
   such as crumbing agents (castor oil) and stabilizer Hydroxyamine Neutral Sulphate
   (HNS), however the residues are not more than 100 ppm.

   Oil extended natural rubber (OENR) grades contain certain amount of rubber
   processing oil.

Page 1 of 4
3. **Possible Hazard**

No possible hazard to man and environment.

4. **First Aid**

General first aid treatment applies.

5. **Fire Fighting Action / Measures**

Raw natural rubber in bale form is not readily ignitable. But, once ignited, it will burn readily with much evolution of heat, smoke and fumes. A rubber fire is difficult to extinguish as heat may soften the rubber and the burning material may flow readily and thus spread the fire. An added hazard is that raw rubber is lighter than water so that the burning material will float on any pool of water. Sprinkler installations and suitable extinguishing media (water or carbon dioxide) are recommended for fire control in storage areas.

6. **Accidental Release Measures**

Natural rubber in solid state has no environmental pollution impact.

7. **Handling and Storage**

A good ventilated storage and handling in warehouse and well protected against fire.

8. **Exposure Control and Personal Protection**

The usual precautions for the handling of industrial product must be observed.

9. **Physical and Chemical Properties**

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appearance</td>
<td>Soft Solid</td>
</tr>
<tr>
<td>Colour</td>
<td>Light Brown to Dark Brown (Depends on rubber grades produced by factory concerned)</td>
</tr>
<tr>
<td>Odour</td>
<td>Mild, Characteristic</td>
</tr>
<tr>
<td>Melting Point</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>Boiling Point</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>Specific gravity (20°C)</td>
<td>0.92</td>
</tr>
<tr>
<td>Bulk Density</td>
<td>0.91 g/cc</td>
</tr>
</tbody>
</table>
10. **Stability and Reactivity Data**

   Stability : Subject to Storage Hardening
   Conditions to avoid : Exposure to Heat or Fire

11. **Toxicological Information**

   Hazard decomposition products : Dry rubber when ignited will give off toxic fumes and smoke.

12. **Environmental Information**

   Natural rubber is biodegradable and harmless to environment.

13. **Waste Disposal Information**

   Disposal method : Must be dumped or incinerated in accordance with current national environmental laws or regulations.

14. **Transport Information**

   Not classified as hazardous under transport regulations.
15. **Regulatory Information**

Labeling according to EEC directions is not required.

---

16. **Other Information**

The information contained herein is based on the present state of our knowledge and does not therefore guarantee certain properties. Recipients of our products must take responsibility for observing existing laws and regulations. This Material Safety Data Sheet is made available on the basis that the users are responsible for their own interpretation of its content. No warranty representation is expressed or implied that the information is accurate, complete or representative. The producer assumes no responsibility for injury to the buyer, the buyer’s employees or any third party caused by normal or abnormal use of the materials.
MATERIAL SAFETY DATA SHEET
STANDARD INDONESIAN RUBBER (SIR)

Ref: HO-SIR/27.09.07
(Replaces Ref: HO140798-271202)

1. **Company Name**: REGIONAL RUBBER TRADING CO. PTE LTD.
   65, Chulia Street, #44-01,
   OCBC Centre,
   Singapore 049513.

   **Products Information**: Tel. No. 65 - 65354055
   Fax No. 65 - 65337341

   **Emergency Information**: Production Factory & Code
   - PT. Hock Lie, Medan (SDH) 061 - 4538044
   - PT. Hock Lie, Rantau Prapat (SCM) 0624 - 21250
   - PT. Hok Tong, Banjarnasim (KAU) 0511 - 3353437
   - PT. Hok Tong, Jambi (SCL) 0741 - 31911
   - PT. Hok Tong, Palembang (SCX) 0711 - 313905
   - PT. Hok Tong, Pontianak (KAZ) 0561 - 883015
   - PT. Remco, Jambi (SBG) 0741 - 581980
   - PT. Remco, Palembang (SDQ) 0711 - 358377
   - PT. Sunan Rubber, Palembang (SCY) 0711 - 356442

   **Product Name**: STANDARD INDONESIAN RUBBER
   - SIR 10
   - SIR 20

2. **Composition / Information of Ingredients**

   Raw natural rubber consists essentially about 95% of the hydrocarbon /
   'cis - polyisoprene' together with small amount of other naturally occurring substances
   such as lipids (1.6%), inositol & carbohydrates (1.6%), proteinous substances (1.4%),
   ash (0.5%), proteinous and nitrogen compound (0.3%).

3. **Possible Hazard**

   No possible hazard to man and environment
4. **First Aid**

General first aid treatment applies.

5. **Fire Fighting Action / Measures**

Raw natural rubber in bale form is not readily ignitable. But, once ignited, it will burn readily with much evolution of heat, smoke and fumes. A rubber fire is difficult to extinguish as heat may soften the rubber and the burning material may flow readily and thus spread the fire. An added hazard is that raw rubber is lighter than water so that the burning material will float on any pool of water. Sprinkler installations and suitable extinguishing media (water or carbon dioxide) are recommended for fire control in storage areas.

6. **Accidental Release Measures**

Natural rubber in solid state has no environmental pollution impact.

7. **Handling and Storage**

A good ventilated storage and handling in warehouse and well protected against fire.

8. **Exposure Control and Personal Protection**

The usual precautions for the handling of industrial product must be observed.

9. **Physical and Chemical Properties**

<table>
<thead>
<tr>
<th>Property</th>
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<tr>
<td>Appearance</td>
<td>Soft Solid</td>
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<td>Melting Point</td>
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<td>Boiling Point</td>
<td>Not Applicable</td>
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<tr>
<td>Specific gravity (20°C)</td>
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<tr>
<td>Bulk Density</td>
<td>0.91 g/cc</td>
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<td>Vapour Pressure</td>
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<td>Viscosity (25°C)</td>
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<td>Solubility</td>
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<tr>
<td>pH value</td>
<td>Not Applicable</td>
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<tr>
<td>Flash Point</td>
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</tr>
<tr>
<td>Property</td>
<td>Value</td>
</tr>
<tr>
<td>----------------------------------</td>
<td>---------------</td>
</tr>
<tr>
<td>Autoignition Temperature</td>
<td>&gt; 400°C</td>
</tr>
<tr>
<td>Explosion Limit</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>Decomposition Point</td>
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</tr>
<tr>
<td>Decomposition Products</td>
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</tr>
<tr>
<td>Hazardous Reaction</td>
<td>None</td>
</tr>
<tr>
<td>Ash</td>
<td>0.5 %</td>
</tr>
<tr>
<td>Lipids</td>
<td>1.6 %</td>
</tr>
<tr>
<td>Proteinous Substances</td>
<td>1.4 %</td>
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10. **Stability and Reactivity Data**

<table>
<thead>
<tr>
<th>Condition</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stability</td>
<td>: Subject to Storage Hardening</td>
</tr>
<tr>
<td>Conditions to avoid</td>
<td>: Exposure to Heat or Fire</td>
</tr>
</tbody>
</table>

11. **Toxicological Information**

<table>
<thead>
<tr>
<th>Hazard decomposition products</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>: Dry rubber when ignited will give off toxic fumes and smoke.</td>
<td></td>
</tr>
</tbody>
</table>

12. **Environmental Information**

Natural rubber is biodegradable and harmless to environment.

13. **Waste Disposal Information**

<table>
<thead>
<tr>
<th>Disposal method</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>: Must be dumped or incinerated in accordance with current national environmental laws or regulations.</td>
<td></td>
</tr>
</tbody>
</table>

14. **Transport Information**

Not classified as hazardous under transport regulations.

15. **Regulatory Information**

Labeling according to EEC directions is not required.
16. **Other Information**

The information contained herein is based on the present state of our knowledge and does not therefore guarantee certain properties. Recipients of our products must take responsibility for observing existing laws and regulations.

This Material Safety Data Sheet is made available on the basis that the users are responsible for their own interpretation of its content. No warranty representation is expressed or implied that the information is accurate, complete or representative. The producer assumes no responsibility for injury to the buyer, the buyer's employees or any third party caused by normal or abnormal use of the materials.
SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers
   Product name : 2-Mercaptobenzothiazole

   Product Number : M3302
   Brand : Aldrich
   Index-No. : 613-108-00-3
   REACH No. : A registration number is not available for this substance as the substance or its uses are exempted from registration, the annual tonnage does not require a registration or the registration is envisaged for a later registration deadline.
   CAS-No. : 149-30-4

1.2 Relevant identified uses of the substance or mixture and uses advised against
   Identified uses : Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet
   Company : Sigma-Aldrich Chemie GmbH
             Riedstrasse 2
             D-89555 STEINHEIM
   Telephone : +49 89-6513-1444
   Fax : +49 7329-97-2319
   E-mail address : eurtechserv@sial.com

1.4 Emergency telephone number
   Emergency Phone # : 0800 181 7059 (CHEMTREC Deutschland)
                        +49 (0)696 43508409 (CHEMTREC weltweit)

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture
   Classification according to Regulation (EC) No 1272/2008
   Skin sensitisation (Category 1), H317
   Acute aquatic toxicity (Category 1), H400
   Chronic aquatic toxicity (Category 1), H410

   For the full text of the H-Statements mentioned in this Section, see Section 16.

   Classification according to EU Directives 67/548/EEC or 1999/45/EC
   N     Dangerous for the environment
         R50/53
         R43

   For the full text of the R-phrases mentioned in this Section, see Section 16.

2.2 Label elements
   Labelling according Regulation (EC) No 1272/2008
   Pictogram

   Signal word : Warning
Hazard statement(s)
H317 May cause an allergic skin reaction.
H410 Very toxic to aquatic life with long lasting effects.

Precautionary statement(s)
P273 Avoid release to the environment.
P280 Wear protective gloves.
P501 Dispose of contents/container to an approved waste disposal plant.

Supplemental Hazard Statements none

2.3 Other hazards - none

SECTION 3: Composition/information on ingredients

3.1 Substances
Synonyms: 2-Benothiazolethiol

Formula: C_7H_5NS_2
Molecular Weight: 167.25 g/mol
CAS-No.: 149-30-4
EC-No.: 205-736-8
Index-No.: 613-108-00-3

Hazardous ingredients according to Regulation (EC) No 1272/2008

<table>
<thead>
<tr>
<th>Component</th>
<th>Classification</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benzothiazole-2-thiol</td>
<td>Skin Sens. 1; Aquatic Acute 1; Aquatic Chronic 1; H317, H410</td>
<td>-</td>
</tr>
</tbody>
</table>

Hazardous ingredients according to Directive 1999/45/EC

<table>
<thead>
<tr>
<th>Component</th>
<th>Classification</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benzothiazole-2-thiol</td>
<td>Xi, N, R43 - R50/53</td>
<td>-</td>
</tr>
</tbody>
</table>

For the full text of the H-Statements and R-Phrases mentioned in this Section, see Section 16

SECTION 4: First aid measures

4.1 Description of first aid measures
General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
no data available
SECTION 5: Firefighting measures

5.1 Extinguishing media
   Suitable extinguishing media
   Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
   Carbon oxides, nitrogen oxides (NOx), Sulphur oxides

5.3 Advice for firefighters
   Wear self contained breathing apparatus for fire fighting if necessary.

5.4 Further information
   no data available

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
   Use personal protective equipment. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Avoid breathing dust.
   For personal protection see section 8.

6.2 Environmental precautions
   Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up
   Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
   For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling
   Avoid contact with skin and eyes. Avoid formation of dust and aerosols.
   Provide appropriate exhaust ventilation at places where dust is formed.
   For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
   Store in cool place. Keep container tightly closed in a dry and well-ventilated place.

7.3 Specific end use(s)
   A part from the uses mentioned in section 1.2 no other specific uses are stipulated

SECTION 8: Exposure controls/personal protection

8.1 Control parameters
   Components with workplace control parameters

8.2 Exposure controls
   Appropriate engineering controls
   Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

   Personal protective equipment
   Eye/face protection
   Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).
   Skin protection
   Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove’s outer surface) to avoid skin contact with this product. Dispose of
contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

The selected protective gloves have to satisfy the specifications of EU Directive 89/686/EEC and the standard EN 374 derived from it.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0,11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0,11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Complete suit protecting against chemicals. The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
For nuisance exposures use type P95 (US) or type P1 (EU EN 143) particle respirator. For higher level protection use type OV/AG/P99 (US) or type ABEK-P2 (EU EN 143) respirator cartridges. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a) Appearance  
Form: crystalline  
Colour: light yellow

b) Odour  
pungent

c) Odour Threshold  
no data available

d) pH  
no data available

e) Melting point/freezing point  
Melting point/range: 177 - 181 °C - lit.

f) Initial boiling point and boiling range  
> 260 °C - Decomposes on heating.

g) Flash point  
200 °C - closed cup

h) Evaporation rate  
no data available

i) Flammability (solid, gas)  
no data available

j) Upper/lower flammability or explosive limits  
Lower explosion limit: 15 %(V)

k) Vapour pressure  
no data available
l) Vapour density  
no data available
m) Relative density  
1,42 g/cm³ at 20 °C
n) Water solubility  
0,118 g/l at 25 °C - insoluble
o) Partition coefficient: n-octanol/water  
log Pow: 2,41
p) Auto-ignition temperature  
no data available
q) Decomposition temperature  
no data available
r) Viscosity  
no data available
s) Explosive properties  
no data available
t) Oxidizing properties  
no data available

9.2 Other safety information
no data available

SECTION 10: Stability and reactivity

10.1 Reactivity
no data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
no data available

10.4 Conditions to avoid
no data available

10.5 Incompatible materials
Oxidizing agents

10.6 Hazardous decomposition products
Other decomposition products - no data available
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - rat - male and female - 3.800 mg/kg
LC50 Inhalation - rat - > 1.270 mg/m³
LD50 Dermal - rabbit - male and female - > 7.940 mg/kg

Skin corrosion/irritation
Skin - rabbit
Result: No skin irritation - 24 h

Serious eye damage/eye irritation
Eyes - rabbit
Result: No eye irritation - 24 h

Respiratory or skin sensitisation
Buehler Test - guinea pig
May cause allergic skin reaction.
Maximisation Test - guinea pig
May cause allergic skin reaction.
**Germ cell mutagenicity**
Ames test  
*S. typhimurium*  
Result: negative

mouse - male and female  
Result: negative

**Carcinogenicity**
IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

**Reproductive toxicity**
no data available

**Specific target organ toxicity - single exposure**
o no data available

**Specific target organ toxicity - repeated exposure**
o no data available

**Aspiration hazard**
o no data available

**Additional Information**
Repeated dose toxicity - rat - male and female - Lowest observed adverse effect level - 2.500 mg/kg  
RTECS: DL6475000  
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

### SECTION 12: Ecological information

#### 12.1 Toxicity

| Toxicity to fish | flow-through test LC50 - Oncorhynchus mykiss (rainbow trout) - 0,73 mg/l - 96 h  
OECD Test Guideline 203 |
| --- | --- |
| Toxicity to daphnia and other aquatic invertebrates | Immobilization EC50 - Daphnia magna (Water flea) - 0,71 mg/l - 48 h  
OECD Test Guideline 202 |
| Toxicity to algae | Growth inhibition EC50 - Selenastrum capricornutum (green algae) - 0,5 mg/l - 72 h  
OECD Test Guideline 201 |

#### 12.2 Persistence and degradability

Biodegradability  
Biotic/Aerobic - Exposure time 28 d  
Result: < 1 % - Not readily biodegradable.

#### 12.3 Bioaccumulative potential

Bioaccumulation  
Cyprinus carpio (Carp) - 42 d  
at 25 °C - 0,1 mg/l  
Bioconcentration factor (BCF): < 0,8

#### 12.4 Mobility in soil

no data available

#### 12.5 Results of PBT and vPvB assessment

PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

#### 12.6 Other adverse effects

Very toxic to aquatic life with long lasting effects.
SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product
Offer surplus and non-recyclable solutions to a licensed disposal company. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Contaminated packaging
Dispose of as unused product.

SECTION 14: Transport information

14.1 UN number
ADR/RID: 3077  IMDG: 3077  IATA: 3077

14.2 UN proper shipping name
ADR/RID: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (Benzothiazole-2-thiol)
IMDG: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (Benzothiazole-2-thiol)
IATA: Environmentally hazardous substance, solid, n.o.s. (Benzothiazole-2-thiol)

14.3 Transport hazard class(es)
ADR/RID: 9  IMDG: 9  IATA: 9

14.4 Packaging group
ADR/RID: III  IMDG: III  IATA: III

14.5 Environmental hazards
ADR/RID: yes  IMDG Marine pollutant: yes  IATA: yes

14.6 Special precautions for user

Further information
EHS-Mark required (ADR 2.2.9.1.10, IMDG code 2.10.3) for single packagings and combination packagings containing inner packagings with Dangerous Goods > 5L for liquids or > 5kg for solids.

SECTION 15: Regulatory information

This safety datasheet complies with the requirements of Regulation (EC) No. 1907/2006.

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture
no data available

15.2 Chemical Safety Assessment
For this product a chemical safety assessment was not carried out

SECTION 16: Other information

Full text of H-statements referred to under sections 2 and 3.
Aquatic Acute  Acute aquatic toxicity
Aquatic Chronic  Chronic aquatic toxicity
H317  May cause an allergic skin reaction.
H400  Very toxic to aquatic life.
H410  Very toxic to aquatic life with long lasting effects.
Skin Sens.  Skin sensitisation

Full text of R-phrases referred to under sections 2 and 3
N  Dangerous for the environment
Xi  Irritant
R43  May cause sensitisation by skin contact.
R50/53  Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.
**Further information**

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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.
SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers
Product name: Calcium carbide

Product Number: 21039
Brand: Aldrich
Index-No.: 006-004-00-9
REACH No.: A registration number is not available for this substance as the substance or its uses are exempted from registration, the annual tonnage does not require a registration or the registration is envisaged for a later registration deadline.
CAS-No.: 75-20-7

1.2 Relevant identified uses of the substance or mixture and uses advised against
Identified uses: Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet
Company: Sigma-Aldrich Chemie GmbH
Riedstrasse 2
D-89555 STEINHEIM

Telephone: +49 89-6513-1444
Fax: +49 7329-97-2319
E-mail address: eurtechserv@sial.com

1.4 Emergency telephone number
Emergency Phone #: 0800 181 7059 (CHEMTREC Deutschland)
+49 (0)696 43508409 (CHEMTREC weltweit)

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture
Classification according to Regulation (EC) No 1272/2008
Substances and mixtures, which in contact with water, emit flammable gases (Category 1), H260
Skin irritation (Category 2), H315
Serious eye damage (Category 1), H318
Specific target organ toxicity - single exposure (Category 3), Respiratory system, H335

For the full text of the H-Statements mentioned in this Section, see Section 16.

Classification according to EU Directives 67/548/EEC or 1999/45/EC
F, Xi Highly flammable, Irritant R15, R37/38, R41

For the full text of the R-phrases mentioned in this Section, see Section 16.

2.2 Label elements
Labelling according Regulation (EC) No 1272/2008
Pictogram

Signal word Danger
2.3 Other hazards - none

SECTION 3: Composition/information on ingredients

3.1 Substances

<table>
<thead>
<tr>
<th>Component</th>
<th>Classification</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calcium carbide</td>
<td>Water-react. 1; Skin Irrit. 2; Eye Dam. 1; STOT SE 3; H260, H315, H318, H335</td>
<td>&lt;= 100 %</td>
</tr>
</tbody>
</table>

Hazardous ingredients according to Directive 1999/45/EC

<table>
<thead>
<tr>
<th>Component</th>
<th>Classification</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calcium carbide</td>
<td>F, R15 - R37/38 - R41</td>
<td>&lt;= 100 %</td>
</tr>
</tbody>
</table>

For the full text of the H-Statements and R-Phrases mentioned in this Section, see Section 16

SECTION 4: First aid measures

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.
In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
no data available

SECTION 5: Firefighting measures

5.1 Extinguishing media
Suitable extinguishing media
Dry powder

5.2 Special hazards arising from the substance or mixture
Calcium oxide

5.3 Advice for firefighters
Wear self contained breathing apparatus for fire fighting if necessary.

5.4 Further information
no data available

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
Use personal protective equipment. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust.
For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up
Sweep up and shovel. Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations (see section 13). Do not flush with water. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid formation of dust and aerosols.
Provide appropriate exhaust ventilation at places where dust is formed. Keep away from sources of ignition - No smoking.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Store in cool place. Keep container tightly closed in a dry and well-ventilated place. Never allow product to get in contact with water during storage.


7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated
SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Components with workplace control parameters

8.2 Exposure controls

Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove’s outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

The selected protective gloves have to satisfy the specifications of EU Directive 89/686/EEC and the standard EN 374 derived from it.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0,11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Skin protection
Material: Nitrile rubber
Minimum layer thickness: 0,11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Body protection
Complete suit protecting against chemicals, Flame retardant protective clothing, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.
SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a) Appearance  Form: crystalline
b) Odour  no data available
c) Odour Threshold  no data available
d) pH  12.48 at 20 g/l
e) Melting point/freezing point  Melting point/range: 2.300 °C
f) Initial boiling point and boiling range  no data available
g) Flash point  no data available
h) Evaporation rate  no data available
i) Flammability (solid, gas)  The product is not flammable. - Flammability (solids)
j) Upper/lower flammability or explosive limits  no data available
k) Vapour pressure  no data available
l) Vapour density  no data available
m) Relative density  2.22 g/mL at 25 °C
n) Water solubility  no data available
o) Partition coefficient: n-octanol/water  no data available
p) Auto-ignition temperature  390 °C
q) Decomposition temperature  no data available
r) Viscosity  no data available
s) Explosive properties  Not explosive
t) Oxidizing properties  no data available

9.2 Other safety information

no data available

SECTION 10: Stability and reactivity

10.1 Reactivity

no data available

10.2 Chemical stability

Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions

React violently with water.

10.4 Conditions to avoid

Exposure to moisture.

10.5 Incompatible materials

Strong oxidizing agents, Reacts violently with water.

10.6 Hazardous decomposition products

Other decomposition products - no data available
SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
no data available

Skin corrosion/irritation
no data available

Serious eye damage/eye irritation
no data available

Respiratory or skin sensitisation
Maximisation Test - guinea pig
Result: Does not cause skin sensitisation.
(OECD Test Guideline 406)

Germ cell mutagenicity
no data available

Carcinogenicity
IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

Reproductive toxicity
no data available

Specific target organ toxicity - single exposure
no data available

Specific target organ toxicity - repeated exposure
no data available

Aspiration hazard
no data available

Additional Information
RTECS: Not available
Cough, Shortness of breath, Headache, Nausea, Vomiting

SECTION 12: Ecological information

12.1 Toxicity

Toxicity to fish
static test LC50 - Oncorhynchus mykiss (rainbow trout) - > 50 mg/l - 96 h
(OECD Test Guideline 203)

Toxicity to daphnia and other aquatic invertebrates
static test EC50 - Daphnia magna (Water flea) - 4,62 mg/l - 48 h
(OECD Test Guideline 202)

Toxicity to algae
static test EC50 - Desmodesmus subspicatus (Scenedesmus subspicatus) - 46 mg/l - 72 h
(OECD Test Guideline 201)

12.2 Persistence and degradability
no data available

12.3 Bioaccumulative potential
no data available

12.4 Mobility in soil
no data available
12. Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects
Toxic to aquatic life.
no data available

SECTION 13: Disposal considerations

13.1 Waste treatment methods
Product
Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Offer surplus and non-recyclable solutions to a licensed disposal company.

Contaminated packaging
Dispose of as unused product.

SECTION 14: Transport information

14.1 UN number
ADR/RID: 1402
IMDG: 1402
IATA: 1402

14.2 UN proper shipping name
ADR/RID: CALCIUM CARBIDE
IMDG: CALCIUM CARBIDE
IATA: Calcium carbide
Passenger Aircraft: Not permitted for transport

14.3 Transport hazard class(es)
ADR/RID: 4.3
IMDG: 4.3
IATA: 4.3

14.4 Packaging group
ADR/RID: I
IMDG: I
IATA: I

14.5 Environmental hazards
ADR/RID: no
IMDG Marine pollutant: no
IATA: no

14.6 Special precautions for user
no data available

SECTION 15: Regulatory information

This safety datasheet complies with the requirements of Regulation (EC) No. 1907/2006.

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture
no data available

15.2 Chemical Safety Assessment
For this product a chemical safety assessment was not carried out

SECTION 16: Other information

Full text of H-Statements referred to under sections 2 and 3.

Eye Dam. Serious eye damage
H260 In contact with water releases flammable gases which may ignite spontaneously.
H315 Causes skin irritation.
H318 Causes serious eye damage.
H335 May cause respiratory irritation.
Skin Irrit. Skin irritation
STOT SE Specific target organ toxicity - single exposure
Water-react. Substances and mixtures, which in contact with water, emit flammable gases
Full text of R-phrases referred to under sections 2 and 3

F  Highly flammable
R15 Contact with water liberates extremely flammable gases.
R37/38 Irritating to respiratory system and skin.
R41 Risk of serious damage to eyes.

Further information
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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.
SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers

<table>
<thead>
<tr>
<th>Product identifier</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product name</td>
<td>Glacial Acetic Acid</td>
</tr>
<tr>
<td>Brand</td>
<td>Sigma-Aldrich</td>
</tr>
<tr>
<td>Index-No.</td>
<td>607-002-00-6</td>
</tr>
<tr>
<td>REACH No.</td>
<td>A registration number is not available for this substance as the substance or its uses are exempted from registration, the annual tonnage does not require a registration or the registration is envisaged for a later registration deadline.</td>
</tr>
<tr>
<td>CAS-No.</td>
<td>64-19-7</td>
</tr>
</tbody>
</table>

1.2 Relevant identified uses of the substance or mixture and uses advised against

| Identified uses          | Laboratory chemicals, Manufacture of substances |

1.3 Details of the supplier of the safety data sheet

| Company                  | Sigma-Aldrich Chemie GmbH |
|                         | Riedstrasse 2             |
|                         | D-89555 STEINHEIM         |
| Telephone               | +49 89-6513-1444         |
| Fax                     | +49 7329-97-2319         |
| E-mail address          | eurtechserv@sial.com     |

1.4 Emergency telephone number

| Emergency Phone #        | 0800 181 7059 (CHEMTREC Deutschland) |
|                         | +49 (0)696 43508409 (CHEMTREC weltweit) |

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

Classification according to Regulation (EC) No 1272/2008
Flammable liquids (Category 3), H226
Skin corrosion (Category 1A), H314

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 Label elements

Labelling according Regulation (EC) No 1272/2008
Pictogram

<table>
<thead>
<tr>
<th>Signal word</th>
<th>Hazard statement(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Danger</td>
<td>Flammable liquid and vapour. Causes severe skin burns and eye damage.</td>
</tr>
</tbody>
</table>
Precautionary statement(s)
P210 Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
P280 Wear protective gloves/ protective clothing/ eye protection/ face protection.
P303 + P361 + P353 IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.
P304 + P340 + P310 IF INHALED: Remove person to fresh air and keep comfortable for breathing. Immediately call a POISON CENTER/doctor.
P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P403 + P235 Store in a well-ventilated place. Keep cool.
Supplemental Hazard Statements none

2.3 Other hazards
This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

SECTION 3: Composition/information on ingredients

3.1 Substances
Molecular weight : 60,05 g/mol
CAS-No. : 64-19-7
EC-No. : 200-580-7
Index-No. : 607-002-00-6

Hazardous ingredients according to Regulation (EC) No 1272/2008

<table>
<thead>
<tr>
<th>Component</th>
<th>Classification</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acetic acid</td>
<td>Flam. Liq. 3; Met. Corr. 1; Skin Corr. 1A; H226, H290, H314</td>
<td>&lt;= 100 %</td>
</tr>
</tbody>
</table>

For the full text of the H-Statements mentioned in this Section, see Section 16.

SECTION 4: First aid measures

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Take off contaminated clothing and shoes immediately. Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.
If swallowed
Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

SECTION 5: Firefighting measures
5.1 Extinguishing media
Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
No data available

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
Use water spray to cool unopened containers.

SECTION 6: Accidental release measures
6.1 Personal precautions, protective equipment and emergency procedures
Use personal protective equipment. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapours accumulating to form explosive concentrations. Vapours can accumulate in low areas. For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

6.3 Methods and materials for containment and cleaning up
Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations (see section 13).

6.4 Reference to other sections
For disposal see section 13.

SECTION 7: Handling and storage
7.1 Precautions for safe handling
Avoid inhalation of vapour or mist. Keep away from sources of ignition - No smoking. Take measures to prevent the build up of electrostatic charge. For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Store in cool place. Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.
Store at Room Temperature.

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated
SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Components with workplace control parameters

8.2 Exposure controls

Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

**Eye/face protection**
Tightly fitting safety goggles. Faceshield (8-inch minimum). Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

**Skin protection**
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove’s outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

The selected protective gloves have to satisfy the specifications of EU Directive 89/686/EEC and the standard EN 374 derived from it.

**Body Protection**
Complete suit protecting against chemicals. Flame retardant antistatic protective clothing. The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

**Respiratory protection**
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

**Control of environmental exposure**
Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

<table>
<thead>
<tr>
<th>a) Appearance</th>
<th>Form: liquid</th>
</tr>
</thead>
<tbody>
<tr>
<td>b) Odour</td>
<td>pungent</td>
</tr>
<tr>
<td>c) Odour Threshold</td>
<td>No data available</td>
</tr>
<tr>
<td>d) pH</td>
<td>2,4 at 60,05 g/l</td>
</tr>
<tr>
<td>e) Melting point/freeze point</td>
<td>16,2 °C</td>
</tr>
<tr>
<td>f) Initial boiling point and boiling range</td>
<td>117,0 - 118,0 °C</td>
</tr>
<tr>
<td>g) Flash point</td>
<td>40,0 °C - closed cup</td>
</tr>
<tr>
<td>h) Evaporation rate</td>
<td>No data available</td>
</tr>
<tr>
<td>i) Flammability (solid, gas)</td>
<td>No data available</td>
</tr>
<tr>
<td>j) Upper/lower flammability or</td>
<td>Upper explosion limit: 19,9 %(V)</td>
</tr>
<tr>
<td></td>
<td>Lower explosion limit: 4 %(V)</td>
</tr>
</tbody>
</table>
explosive limits

k) Vapour pressure  
   73.3 hPa at 50.0 °C
   15.2 hPa at 20.0 °C

l) Vapour density  
   No data available

m) Relative density  
   1.05 g/cm³

n) Water solubility  
   completely miscible

o) Partition coefficient: n-octanol/water  
   log Pow: -0.169

p) Auto-ignition temperature  
   485.0 °C

q) Decomposition temperature  
   No data available

r) Viscosity  
   No data available

s) Explosive properties  
   No data available

t) Oxidizing properties  
   No data available

9.2 Other safety information

Surface tension  
   28.8 mN/m at 10.0 °C

SECTION 10: Stability and reactivity

10.1 Reactivity  
   No data available

10.2 Chemical stability  
   Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions  
   No data available

10.4 Conditions to avoid  
   Heat, flames and sparks.

10.5 Incompatible materials  
   Oxidizing agents, Soluble carbonates and phosphates, Hydroxides, Metals, Peroxides, permanganates, e.g. potassium permanganate, Amines, Alcohols, Nitric acid

10.6 Hazardous decomposition products  
   Hazardous decomposition products formed under fire conditions. - Carbon oxides
   In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity

LD50 Oral - Rat - 3.310 mg/kg

LC50 Inhalation - Mouse - 1 h - 5620 ppm


LC50 Inhalation - Rat - 4 h - 11.4 mg/l

LD50 Dermal - Rabbit - 1.112 mg/kg

Skin corrosion/irritation  
   Skin - Rabbit
   Result: Causes severe burns.
**Serious eye damage/eye irritation**
Eyes - Rabbit
Result: Corrosive to eyes

**Respiratory or skin sensitisation**
No data available

**Germ cell mutagenicity**
No data available

**Carcinogenicity**
IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

**Reproductive toxicity**
No data available

**Specific target organ toxicity - single exposure**
No data available

**Specific target organ toxicity - repeated exposure**
No data available

**Aspiration hazard**
No data available

**Additional Information**
RTECS: Not available

Material is extremely destructive to tissue of the mucous membranes and upper respiratory tract, eyes, and skin., spasm, inflammation and edema of the larynx, spasm, inflammation and edema of the bronchi, pneumonitis, pulmonary edema, burning sensation, Cough, wheezing, laryngitis, Shortness of breath, Headache, Nausea, Vomiting. Ingestion or inhalation of concentrated acetic acid causes damage to tissues of the respiratory and digestive tracts. Symptoms include: hematemesis, bloody diarrhea, edema and/or perforation of the esophagus and pylorus, pancreatitis, hematuria, anuria, uremia, albuminuria, hemolysis, convulsions, bronchitis, pulmonary edema, pneumonia, cardiovascular collapse, shock, and death. Direct contact or exposure to high concentrations of vapor with skin or eyes can cause: erythema, blisters, tissue destruction with slow healing, skin blackening, hyperkeratosis, fissures, corneal erosion, opacification, iritis, conjunctivitis, and possible blindness. To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

---

**SECTION 12: Ecological information**

**12.1 Toxicity**

**Toxicity to fish**
semi-static test LC50 - Oncorhynchus mykiss (rainbow trout) - > 1.000 mg/l - 96 h
OECD Test Guideline 203

**Toxicity to daphnia and other aquatic invertebrates**
EC50 - Daphnia magna (Water flea) - > 300,82 mg/l - 48 h
OECD Test Guideline 202

**12.2 Persistence and degradability**

**Biodegradability**
aerobic - Exposure time 30 d
Result: 99 % - Readily biodegradable.
Remarks: Expected to be biodegradable

**Biochemical Oxygen Demand (BOD)**
880 mg/g

**12.3 Bioaccumulative potential**
No data available

**12.4 Mobility in soil**
No data available
12.5 Results of PBT and vPvB assessment
This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

12.6 Other adverse effects
Additional ecological information
No data available

SECTION 13: Disposal considerations

13.1 Waste treatment methods
Product
Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Offer surplus and non-recyclable solutions to a licensed disposal company.

Contaminated packaging
Dispose of as unused product.

SECTION 14: Transport information

14.1 UN number
ADR/RID: 2789
IMDG: 2789
IATA: 2789

14.2 UN proper shipping name
ADR/RID: ACETIC ACID, GLACIAL
IMDG: ACETIC ACID, GLACIAL
IATA: Acetic acid, glacial

14.3 Transport hazard class(es)
ADR/RID: 8 (3)
IMDG: 8 (3)
IATA: 8 (3)

14.4 Packaging group
ADR/RID: II
IMDG: II
IATA: II

14.5 Environmental hazards
ADR/RID: no
IMDG Marine pollutant: no
IATA: no

14.6 Special precautions for user
No data available

SECTION 15: Regulatory information

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture
This safety datasheet complies with the requirements of Regulation (EC) No. 1907/2006.

15.2 Chemical safety assessment
For this product a chemical safety assessment was not carried out

SECTION 16: Other information

Full text of H-Statements referred to under sections 2 and 3.

H226 Flammable liquid and vapour.
H290 May be corrosive to metals.
H314 Causes severe skin burns and eye damage.
H315 Causes skin irritation.
H319 Causes serious eye irritation.
Further information
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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.
SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers
   Product name: Polyacrylamide

   Product Number: 92560
   Brand: Sigma
   REACH No.: A registration number is not available for this substance as the substance or its uses are exempted from registration, the annual tonnage does not require a registration or the registration is envisaged for a later registration deadline.
   CAS-No.: 9003-05-8

1.2 Relevant identified uses of the substance or mixture and uses advised against
   Identified uses: Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet
   Company: Sigma-Aldrich Chemie GmbH
   Riedstrasse 2
   D-89555 STEINHEIM
   Telephone: +49 89-6513-1444
   Fax: +49 7329-97-2319
   E-mail address: eurtechserv@sial.com

1.4 Emergency telephone number
   Emergency Phone #: 0800 181 7059 (CHEMTREC Deutschland)
   +49 (0)696 43508409 (CHEMTREC weltweit)

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture
   Not a hazardous substance or mixture according to Regulation (EC) No. 1272/2008. This substance is not classified as dangerous according to Directive 67/548/EEC.

2.2 Label elements
   The product does not need to be labelled in accordance with EC directives or respective national laws.

2.3 Other hazards
   This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

SECTION 3: Composition/information on ingredients

3.1 Substances
   CAS-No.: 9003-05-8

   No components need to be disclosed according to the applicable regulations.
SECTION 4: First aid measures

4.1 Description of first aid measures

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration.

In case of skin contact
Wash off with soap and plenty of water.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
Carbon oxides, Nitrogen oxides (NOx)

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
No data available

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
Avoid dust formation. Avoid breathing vapours, mist or gas.
For personal protection see section 8.

6.2 Environmental precautions
No special environmental precautions required.

6.3 Methods and materials for containment and cleaning up
Sweep up and shovel. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling
Provide appropriate exhaust ventilation at places where dust is formed.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Store in cool place. Keep container tightly closed in a dry and well-ventilated place.
Storage class (TRGS 510): Non Combustible Solids

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated
SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Components with workplace control parameters

8.2 Exposure controls

Appropriate engineering controls
General industrial hygiene practice.

Personal protective equipment

Eye/face protection
Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove’s outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

The selected protective gloves have to satisfy the specifications of EU Directive 89/686/EEC and the standard EN 374 derived from it.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0,11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0,11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374

If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Choose body protection in relation to its type, to the concentration and amount of dangerous substances, and to the specific work-place. The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Respiratory protection is not required. Where protection from nuisance levels of dusts are desired, use type N95 (US) or type P1 (EN 143) dust masks. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
No special environmental precautions required.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a) Appearance Form: solid
b) Odour No data available
c) Odour Threshold | No data available

d) pH | No data available

e) Melting point/freezing point | Melting point/range: 246 - 250 °C

f) Initial boiling point and boiling range | No data available

g) Flash point | No data available

h) Evaporation rate | No data available

i) Flammability (solid, gas) | May form combustible dust concentrations in air

j) Upper/lower flammability or explosive limits | No data available

k) Vapour pressure | No data available

l) Vapour density | No data available

m) Relative density | 0.750 g/cm³

n) Water solubility | No data available

o) Partition coefficient: n-octanol/water | No data available

p) Auto-ignition temperature | No data available

q) Decomposition temperature | No data available

r) Viscosity | No data available

s) Explosive properties | No data available

t) Oxidizing properties | No data available

9.2 Other safety information
No data available

SECTION 10: Stability and reactivity

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
No data available

10.5 Incompatible materials
Strong oxidizing agents

10.6 Hazardous decomposition products
Other decomposition products - No data available
In the event of fire: see section 5
SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - > 1.000 mg/kg

Skin corrosion/irritation
No data available

Serious eye damage/eye irritation
No data available

Respiratory or skin sensitisation
No data available

Germ cell mutagenicity
No data available

Carcinogenicity
IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

Reproductive toxicity
No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

Additional Information
RTECS: Not available
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

SECTION 12: Ecological information

12.1 Toxicity
No data available

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

12.6 Other adverse effects
No data available
SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product
Offer surplus and non-recyclable solutions to a licensed disposal company.

Contaminated packaging
Dispose of as an unused product.

SECTION 14: Transport information

14.1 UN number
ADR/RID: - IMDG: - IATA: -

14.2 UN proper shipping name
ADR/RID: Not dangerous goods
IMDG: Not dangerous goods
IATA: Not dangerous goods

14.3 Transport hazard class(es)
ADR/RID: - IMDG: - IATA: -

14.4 Packaging group
ADR/RID: - IMDG: - IATA: -

14.5 Environmental hazards
ADR/RID: no IMDG Marine pollutant: no IATA: no

14.6 Special precautions for user
No data available

SECTION 15: Regulatory information

This safety datasheet complies with the requirements of Regulation (EC) No. 1907/2006.

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture
No data available

15.2 Chemical Safety Assessment
For this product a chemical safety assessment was not carried out

SECTION 16: Other information

Further information
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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.
SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers
   Product name: Lead(II) chromate
   Product Number: 310441
   Brand: Sigma-Aldrich
   Index-No.: 082-004-00-2
   REACH No.: A registration number is not available for this substance as the substance or its uses are exempted from registration, the annual tonnage does not require a registration or the registration is envisaged for a later registration deadline.
   CAS-No.: 7758-97-6

1.2 Relevant identified uses of the substance or mixture and uses advised against
   Identified uses: Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet
   Company: Sigma-Aldrich Chemie GmbH
   Riedstrasse 2
   D-89555 STEINHEIM
   Telephone: +49 89-6513-1444
   Fax: +49 7329-97-2319
   E-mail address: eurtechserv@sial.com

1.4 Emergency telephone number
   Emergency Phone #: 0800 181 7059 (CHEMTREC Deutschland)
   +49 (0)696 43508409 (CHEMTREC weltweit)

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture
   Classification according to Regulation (EC) No 1272/2008
   Carcinogenicity (Category 1B), H350
   Reproductive toxicity (Category 1A), H360Df
   Specific target organ toxicity - repeated exposure (Category 2), H373
   Acute aquatic toxicity (Category 1), H400
   Chronic aquatic toxicity (Category 1), H410
   For the full text of the H-Statements mentioned in this Section, see Section 16.

   Classification according to EU Directives 67/548/EEC or 1999/45/EC
   R45
   R61
   R62
   R33
   N Dangerous for the environment R50/53
   For the full text of the R-phrases mentioned in this Section, see Section 16.
2.2 Label elements

Labelling according Regulation (EC) No 1272/2008

Signal word: Danger

Hazard statement(s)
- H350: May cause cancer.
- H360Df: May damage the unborn child. Suspected of damaging fertility.
- H373: May cause damage to organs through prolonged or repeated exposure.
- H410: Very toxic to aquatic life with long lasting effects.

Precautionary statement(s)
- P201: Obtain special instructions before use.
- P273: Avoid release to the environment.
- P308 + P313: IF exposed or concerned: Get medical advice/ attention.
- P501: Dispose of contents/ container to an approved waste disposal plant.

Supplemental Hazard Statements
- none

Restricted to professional users.

2.3 Other hazards

This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

SECTION 3: Composition/information on ingredients

3.1 Substances

<table>
<thead>
<tr>
<th>Component</th>
<th>Classification</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Formula</td>
<td>CrO$_4$Pb</td>
<td></td>
</tr>
<tr>
<td>Molecular weight</td>
<td>323.19 g/mol</td>
<td></td>
</tr>
<tr>
<td>CAS-No.</td>
<td>7758-97-6</td>
<td></td>
</tr>
<tr>
<td>EC-No.</td>
<td>231-846-0</td>
<td></td>
</tr>
<tr>
<td>Index-No.</td>
<td>082-004-00-2</td>
<td></td>
</tr>
</tbody>
</table>

Hazardous ingredients according to Regulation (EC) No 1272/2008

- Lead chromate: Included in the Candidate List of Substances of Very High Concern (SVHC) according to Regulation (EC) No. 1907/2006 (REACH)

<table>
<thead>
<tr>
<th>Component</th>
<th>Classification</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAS-No.</td>
<td>7758-97-6</td>
<td>Carc. 1B; Repr. 1A; STOT RE 2; Aquatic Acute 1; Aquatic Chronic 1; H350, H360Df, H373, H410</td>
</tr>
<tr>
<td>EC-No.</td>
<td>231-846-0</td>
<td>&lt;= 100 %</td>
</tr>
<tr>
<td>Index-No.</td>
<td>082-004-00-2</td>
<td></td>
</tr>
</tbody>
</table>

Hazardous ingredients according to Directive 1999/45/EC

- Lead chromate: Included in the Candidate List of Substances of Very High Concern (SVHC) according to Regulation (EC) No. 1907/2006 (REACH)

<table>
<thead>
<tr>
<th>Component</th>
<th>Classification</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>EC-No.</td>
<td>231-846-0</td>
<td>&lt;= 100 %</td>
</tr>
<tr>
<td>Index-No.</td>
<td>082-004-00-2</td>
<td></td>
</tr>
</tbody>
</table>

For the full text of the H-Statements and R-Phrases mentioned in this Section, see Section 16
SECTION 4: First aid measures

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
Lead oxides, Chromium oxides

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
No data available

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
Use personal protective equipment. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust. For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up
Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid formation of dust and aerosols. Avoid exposure - obtain special instructions before use. Provide appropriate exhaust ventilation at places where dust is formed. For precautions see section 2.2.
7.2 Conditions for safe storage, including any incompatibilities
Store in cool place. Keep container tightly closed in a dry and well-ventilated place.
Storage class (TRGS 510): Non-combustible, acute toxic Cat.3 / toxic hazardous materials or hazardous materials causing chronic effects

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

SECTION 8: Exposure controls/personal protection

8.1 Control parameters
Components with workplace control parameters

8.2 Exposure controls
Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection
Safety glasses with side-shields conforming to EN166 Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove’s outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

The selected protective gloves have to satisfy the specifications of EU Directive 89/686/EEC and the standard EN 374 derived from it.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Complete suit protecting against chemicals. The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).
Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Appearance</td>
<td>Form: powder</td>
</tr>
<tr>
<td></td>
<td>Colour: dark yellow</td>
</tr>
<tr>
<td>b) Odour</td>
<td>No data available</td>
</tr>
<tr>
<td>c) Odour Threshold</td>
<td>No data available</td>
</tr>
<tr>
<td>d) pH</td>
<td>No data available</td>
</tr>
<tr>
<td>e) Melting point/freezing point</td>
<td>No data available</td>
</tr>
<tr>
<td>f) Initial boiling point and boiling range</td>
<td>No data available</td>
</tr>
<tr>
<td>g) Flash point</td>
<td>Not applicable</td>
</tr>
<tr>
<td>h) Evaporation rate</td>
<td>No data available</td>
</tr>
<tr>
<td>i) Flammability (solid, gas)</td>
<td>No data available</td>
</tr>
<tr>
<td>j) Upper/lower flammability or explosive limits</td>
<td>No data available</td>
</tr>
<tr>
<td>k) Vapour pressure</td>
<td>No data available</td>
</tr>
<tr>
<td>l) Vapour density</td>
<td>No data available</td>
</tr>
<tr>
<td>m) Relative density</td>
<td>6,300 g/cm3</td>
</tr>
<tr>
<td>n) Water solubility</td>
<td>No data available</td>
</tr>
<tr>
<td>o) Partition coefficient: n-octanol/water</td>
<td>No data available</td>
</tr>
<tr>
<td>p) Auto-ignition temperature</td>
<td>No data available</td>
</tr>
<tr>
<td>q) Decomposition temperature</td>
<td>No data available</td>
</tr>
<tr>
<td>r) Viscosity</td>
<td>No data available</td>
</tr>
<tr>
<td>s) Explosive properties</td>
<td>No data available</td>
</tr>
<tr>
<td>t) Oxidizing properties</td>
<td>No data available</td>
</tr>
</tbody>
</table>

9.2 Other safety information
No data available

SECTION 10: Stability and reactivity

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
No data available
10.5 **Incompatible materials**
Organic materials, Powdered metals

10.6 **Hazardous decomposition products**
Other decomposition products - No data available
In the event of fire: see section 5

**SECTION 11: Toxicological information**

11.1 **Information on toxicological effects**

**Acute toxicity**
LD50 Oral - Mouse - > 12,000 mg/kg

**Skin corrosion/irritation**
No data available

**Serious eye damage/eye irritation**
No data available

**Respiratory or skin sensitisation**
No data available

**Germ cell mutagenicity**
No data available

**Carcinogenicity**
Carcinogenicity - Rat - Intramuscular

Carcinogenicity - Rat - Subcutaneous
Tumorigenic:Neoplastic by RTECS criteria. Tumorigenic:Tumors at site or application.

Carcinogenicity - Rat - Subcutaneous
Tumorigenic:Equivocal tumorigenic agent by RTECS criteria. Tumorigenic:Tumors at site or application.

Human carcinogen.

IARC: 
1 - Group 1: Carcinogenic to humans (Lead chromate)

2A - Group 2A: Probably carcinogenic to humans (Lead chromate)

IARC: 
1 - Group 1: Carcinogenic to humans (Lead chromate)

2A - Group 2A: Probably carcinogenic to humans (Lead chromate)

**Reproductive toxicity**
Known human reproductive toxicant

**Specific target organ toxicity - single exposure**
No data available

**Specific target organ toxicity - repeated exposure**
May cause damage to organs through prolonged or repeated exposure.
No data available

**Aspiration hazard**
No data available

**Additional Information**
RTECS: GB2975000
Lead salts have been reported to cross the placenta and to induce embryo- and feto- mortality. They also have teratogenic effect in some animal species. No teratogenic effects have been reported with exposure to organometallic lead compounds. Adverse effects of lead on human reproduction, embryonic and fetal development, and postnatal (e.g., mental) development have been reported. Excessive exposure can affect blood, nervous, and digestive systems. The synthesis of hemoglobin is inhibited and results in
anemia. If left untreated, neuromuscular dysfunction, possible paralysis, and encephalopathy can result. Additional symptoms of overexposure include: joint and muscle pain, weakness of the extensor muscles (frequently the hand and wrist), headache, dizziness, abdominal pain, diarrhea, constipation, nausea, vomiting, blue line on the gums, insomnia, and metallic taste. High body levels produce increased cerebrospinal pressure, brain damage, and stupor leading to coma and often death. To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

SECTION 12: Ecological information

12.1 Toxicity
No data available

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

12.6 Other adverse effects
Very toxic to aquatic life.

SECTION 13: Disposal considerations

13.1 Waste treatment methods
Product
Offer surplus and non-recyclable solutions to a licensed disposal company. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Contaminated packaging
Dispose of as unused product.

SECTION 14: Transport information

14.1 UN number
ADR/RID: 3077
IMDG: 3077
IATA: 3077

14.2 UN proper shipping name
ADR/RID: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (Lead chromate)
IMDG: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (Lead chromate)
IATA: Environmentally hazardous substance, solid, n.o.s. (Lead chromate)

14.3 Transport hazard class(es)
ADR/RID: 9
IMDG: 9
IATA: 9

14.4 Packaging group
ADR/RID: III
IMDG: III
IATA: III

14.5 Environmental hazards
ADR/RID: yes
IMDG Marine pollutant: yes
IATA: yes

14.6 Special precautions for user

Further information
EHS-Mark required (ADR 2.2.9.1.10, IMDG code 2.10.3) for single packagings and combination packagings containing inner packagings with Dangerous Goods > 5L for liquids or > 5kg for solids.
SECTION 15: Regulatory information

This safety datasheet complies with the requirements of Regulation (EC) No. 1907/2006.

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture

Authorisations and/or restrictions on use

Lead chromate CAS-No.: 7758-97-6
REACH - List of substances subject to authorisation (Annex XIV)
Carcinogenic (category 1B)
Sunset Date: 21.05.2015

Lead chromate CAS-No.: 7758-97-6
REACH - Candidate List of Substances of Very High Concern for Authorisation (Article 59).
Carcinogenic (article 57a)
ED/68/2009

15.2 Chemical Safety Assessment

For this product a chemical safety assessment was not carried out

SECTION 16: Other information

Full text of H-Statements referred to under sections 2 and 3.

Aquatic Acute Acute aquatic toxicity
Aquatic Chronic Chronic aquatic toxicity
Carc. Carcinogenicity
H350 May cause cancer.
H360Df May damage the unborn child. Suspected of damaging fertility.
H373 May cause damage to organs through prolonged or repeated exposure.
H400 Very toxic to aquatic life.
H410 Very toxic to aquatic life with long lasting effects.

Full text of R-phrases referred to under sections 2 and 3

N Dangerous for the environment
T Toxic
R33 Danger of cumulative effects.
R45 May cause cancer.
R50/53 Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.
R61 May cause harm to the unborn child.
R62 Possible risk of impaired fertility.
Repr.Cat.1 Toxic to Reproduction Category 1
Repr.Cat.3 Toxic to Reproduction Category 3

Further information
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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.
- MATERIAL SAFETY DATA SHEET -

SECTION 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

MSDS Name : Dimethicone
Company Identification : Clearsynth Labs Pvt. Ltd.
413 Laxmi Mall, New Link Road, Andheri (W),
Mumbai-400 053, INDIA
For information call : ++91-22-26355700
For emergencies call : ++91-22-26355699
For further enquiries : info@clearsynth.com

SECTION 2 - COMPOSITION, INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>CAS#</th>
<th>Chemical Name</th>
<th>%</th>
<th>EINECS#</th>
<th>Haz Symbols</th>
<th>RISK PHRASES</th>
</tr>
</thead>
<tbody>
<tr>
<td>9006-65-9</td>
<td>Dimethicone</td>
<td>&gt;95%</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Hazard Symbols: XN
Risk Phrases: 22

SECTION 3 - HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW
Harmful if swallowed:

Potential Health Effects
The toxicological properties of this material have not been investigated. Use appropriate procedures to prevent opportunities for direct contact with the skin or eyes and to prevent inhalation. Compound is Non-hazardous, Non-Toxic/Non-Flammable.

SECTION 4 - FIRST AID MEASURES

Eyes:
Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids.

Skin:
Flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes.

Ingestion:
Do NOT induce vomiting. If conscious and alert, rinse mouth and drink 2-4 cupfuls of milk or water.

Inhalation:
Remove from exposure and move to fresh air immediately.

Notes to Physician:

SECTION 5 - FIRE FIGHTING MEASURES

General Information:
As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or
combustion.
Extinguishing Media:
In case of fire, use water, dry chemical, chemical foam, or alcohol-resistant foam.

SECTION 6 - ACCIDENTAL RELEASE MEASURES

General Information: Use proper personal protective equipment as indicated in Section 8.
Spills/Leaks:
Clean up spills immediately, observing precautions in the Protective Equipment section. Sweep up, then place into a suitable container for disposal.

SECTION 7 - HANDLING and STORAGE

Handling:
Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Avoid contact with eyes, skin, and clothing. Avoid ingestion and inhalation.
Storage:
Store in a well closed container.

SECTION 8 - EXPOSURE CONTROLS, PERSONAL PROTECTION

Engineering Controls:
Use adequate general or local exhaust ventilation to keep airborne concentrations below the permissible exposure limits.
Use process enclosure, local exhaust ventilation, or other engineering controls to control airborne levels.
Personal Protective Equipment
Eyes:
Wear safety glasses and chemical goggles if splashing is possible.
Skin:
Wear appropriate protective gloves and clothing to prevent skin exposure.
Clothing:
Wear appropriate protective clothing to minimize contact with skin.
Respirators:
Wear a NIOSH/MSHA or European Standard EN 149 approved full-facepiece airline respirator in the positive pressure mode with emergency escape provisions.

SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES

Physical State: Clear Colorless Oil
Molecular Formula: C3H9S(C2H6OS)nCH3
Molecular Weight:

SECTION 10 - STABILITY AND REACTIVITY

Chemical Stability:
Stable under normal temperatures and pressures.
Conditions to Avoid:
Incompatible materials, strong oxidants.
Incompatibilities with Other Materials:
Strong oxidizing agents, strong bases.
Hazardous Decomposition Products:
Nitrogen oxides, carbon monoxide, irritating and toxic fumes and gases, carbon dioxide, nitrogen.
Hazardous Polymerization: Has not been reported.

SECTION 11 - TOXICOLOGICAL INFORMATION
RTECS#: 
CAS#: LD50/LC50:
CAS#: Draize test, rabbit, eye: 100 mg/24H Moderate; Oral:
mouse: LD50 = 300 mg/kg; Oral, rabbit: LD50 = 3200 mg/kg; Oral, rat:
LD50 = 980 mg/kg.
Carcinogenicity:
Salicylamide:
Not listed by ACGIH, IARC, NIOSH, NTP, or OSHA.
See actual entry in RTECS for complete information.

SECTION 12 - ECOLOGICAL INFORMATION

SECTION 13 - DISPOSAL CONSIDERATIONS

Dispose of in a manner consistent with federal, state, and local regulations.

SECTION 14 - TRANSPORT INFORMATION

IATA  No information available.
IMO  No information available.
ID/ADR  No information available.

SECTION 15 - REGULATORY INFORMATION

European/International Regulations
European Labeling in Accordance with EC Directives
Hazard Symbols: XN
Risk Phrases:
R 22 Harmful if swallowed.
Safety Phrases:
WGK (Water Danger/Protection)
CAS# United Kingdom Occupational Exposure Limits
United Kingdom Maximum Exposure Limits

Canada
CAS# is listed on Canada's DSL List.
CAS# is not listed on Canada's Ingredient Disclosure List.
Exposure Limits
US FEDERAL
TSCA
CAS# is listed on the TSCA inventory.

SECTION 16 - ADDITIONAL INFORMATION

The information above is believed to be accurate and represents the best information currently available to us. However, we
make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we
assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the
information for their particular purposes. In no way shall the company be liable for any claims, losses, or damages of any
third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising,
even if the company has been advised of the possibility of such damages.

------------------------------------------------------------------------------------
SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers
   Product name : Morpholine

   Product Number : 394467
   Brand : Aldrich
   Index-No. : 613-028-00-9
   REACH No. : A registration number is not available for this substance as the substance or its uses are exempted from registration, the annual tonnage does not require a registration or the registration is envisaged for a later registration deadline.
   CAS-No. : 110-91-8

1.2 Relevant identified uses of the substance or mixture and uses advised against
   Identified uses : Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet
   Company : Sigma-Aldrich Chemie GmbH
              Riedstrasse 2
              D-89555 STEINHEIM
   Telephone : +49 89-6513-1444
   Fax : +49 7329-97-2319
   E-mail address : eurtechserv@sial.com

1.4 Emergency telephone number
   Emergency Phone # : 0800 181 7059 (CHEMTREC Deutschland)
                        +49 (0)696 43508409 (CHEMTREC weltweit)

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture
   Classification according to Regulation (EC) No 1272/2008
   Flammable liquids (Category 3), H226
   Acute toxicity, Oral (Category 4), H302
   Acute toxicity, Inhalation (Category 3), H331
   Acute toxicity, Dermal (Category 3), H311
   Skin corrosion (Category 1A), H314
   For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 Label elements
   Labelling according Regulation (EC) No 1272/2008
   Pictogram
   Signal word : Danger
Hazard statement(s)
H226 Flammable liquid and vapour.
H302 Harmful if swallowed.
H311 + H331 Toxic in contact with skin or if inhaled.
H314 Causes severe skin burns and eye damage.

Precautionary statement(s)
P210 Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
P280 Wear protective gloves/ protective clothing/ eye protection/ face protection.
P303 + P361 + P353 IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.
P304 + P340 + P310 IF INHALED: Remove person to fresh air and keep comfortable for breathing. Immediately call a POISON CENTER or doctor/physician.
P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P370 + P378 In case of fire: Use dry powder or dry sand to extinguish.

Supplemental Hazard Statements none

2.3 Other hazards
This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

SECTION 3: Composition/information on ingredients

3.1 Substances
Synonyms : Tetrahydro-1,4-oxazine

Formula : C₄H₉NO
Molecular weight : 87.12 g/mol
CAS-No. : 110-91-8
EC-No. : 203-815-1
Index-No. : 613-028-00-9

Hazardous ingredients according to Regulation (EC) No 1272/2008

<table>
<thead>
<tr>
<th>Component</th>
<th>Classification</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Morpholine</td>
<td>Flam. Liq. 3; Acute Tox. 4; Acute Tox. 3; Skin Corr. 1A; H226, H302, H331, H311, H314</td>
<td>&lt;= 100 %</td>
</tr>
</tbody>
</table>

For the full text of the H-Statements mentioned in this Section, see Section 16.

SECTION 4: First aid measures

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Take off contaminated clothing and shoes immediately. Wash off with soap and plenty of water. Take victim immediately to hospital. Consult a physician.
In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If swallowed
Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

SECTION 5: Firefighting measures

5.1 Extinguishing media
Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
Carbon oxides, Nitrogen oxides (NOx)

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
Use water spray to cool unopened containers.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
Wear respiratory protection. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapours accumulating to form explosive concentrations. Vapours can accumulate in low areas.
For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up
Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations (see section 13).

6.4 Reference to other sections
For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.
Keep away from sources of ignition - No smoking. Take measures to prevent the build up of electrostatic charge.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Store in cool place. Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.
Hygroscopic.
Storage class (TRGS 510): Flammable liquids

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated
SECTION 8: Exposure controls/personal protection

8.1 Control parameters
Components with workplace control parameters

8.2 Exposure controls
Appropriate engineering controls
Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product.

Personal protective equipment

Eye/face protection
Tightly fitting safety goggles. Faceshield (8-inch minimum). Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

The selected protective gloves have to satisfy the specifications of EU Directive 89/686/EEC and the standard EN 374 derived from it.

Full contact
Material: butyl-rubber
Minimum layer thickness: 0,3 mm
Break through time: 480 min
Material tested:Butoject® (KCL 897 / Aldrich Z677647, Size M)

Splash contact
Material: butyl-rubber
Minimum layer thickness: 0,3 mm
Break through time: 480 min
Material tested:Butoject® (KCL 897 / Aldrich Z677647, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Complete suit protecting against chemicals, Flame retardant antistatic protective clothing., The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.
SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a) Appearance
   Form: liquid
   Colour: colourless

b) Odour
   unpleasant

c) Odour Threshold
   No data available

d) pH
   10.6 at 5 g/l at 20 °C

e) Melting point/freezing point
   Melting point/range: -7 - -5 °C - lit.

f) Initial boiling point and boiling range
   129 °C - lit.

g) Flash point
   31 °C - closed cup

h) Evaporation rate
   No data available

i) Flammability (solid, gas)
   No data available

j) Upper/lower flammability or explosive limits
   Upper explosion limit: 10.8 % (V)
   Lower explosion limit: 1.8 % (V)

k) Vapour pressure
   41 hPa at 38 °C
   9 hPa at 20 °C

l) Vapour density
   3.01 - (Air = 1.0)

m) Relative density
   0.996 g/cm³ at 25 °C

n) Water solubility
   completely miscible

o) Partition coefficient: n-octanol/water
   log Pow: -2.55 at 25 °C

p) Auto-ignition temperature
   255 °C at 1.013 hPa

q) Decomposition temperature
   No data available

r) Viscosity
   No data available

s) Explosive properties
   No data available

t) Oxidizing properties
   No data available

9.2 Other safety information

Relative vapour density
   3.01 - (Air = 1.0)

SECTION 10: Stability and reactivity

10.1 Reactivity
   No data available

10.2 Chemical stability
   Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
   No data available

10.4 Conditions to avoid
   Heat, flames and sparks.

10.5 Incompatible materials
   Strong oxidizing agents
10.6 Hazardous decomposition products
Other decomposition products - No data available
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

**Acute toxicity**
LD50 Oral - Rat - male and female - 1.900 mg/kg
(OECD Test Guideline 401)
LD50 Dermal - Rabbit - male - 500 mg/kg
(OECD Test Guideline 402)

**Skin corrosion/irritation**
Skin - Rabbit
Result: Causes severe burns.
(OECD Test Guideline 404)

**Serious eye damage/eye irritation**
Eyes - Rabbit
Result: Corrosive
(OECD Test Guideline 405)

**Respiratory or skin sensitisation**
Buehler Test - Guinea pig
Result: Did not cause sensitisation on laboratory animals.

**Germ cell mutagenicity**
unscheduled DNA synthesis assay
rat hepatocytes
Result: negative

Hamster - female
Result: negative

**Carcinogenicity**
Carcinogenicity - Mouse - Oral
Tumorigenic:Neoplastic by RTECS criteria. Lungs, Thorax, or Respiration:Bronchiogenic carcinoma.
Liver:Tumors.
IARC: 3 - Group 3: Not classifiable as to its carcinogenicity to humans (Morpholine)

**Reproductive toxicity**
No data available

**Specific target organ toxicity - single exposure**
No data available

**Specific target organ toxicity - repeated exposure**
No data available

**Aspiration hazard**
No data available

**Additional Information**
Repeated dose Rat - female - Oral - LOAEL : 500 mg/kg
toxicity
RTECS: QD6475000

Material is extremely destructive to tissue of the mucous membranes and upper respiratory tract, eyes, and skin., Cough, Shortness of breath, Headache, Nausea
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.
SECTION 12: Ecological information

12.1 Toxicity
Toxicity to fish static test LC50 - Oncorhynchus mykiss (rainbow trout) - 380 mg/l - 96 h
Toxicity to daphnia and other aquatic invertebrates Immobilization EC50 - Daphnia magna (Water flea) - 45 mg/l - 48 h (OECD Test Guideline 202)
Toxicity to algae static test EC50 - Pseudokirchneriella subcapitata - 28 mg/l - 96 h

12.2 Persistence and degradability
Biodegradability aerobic - Exposure time 25 d Result: 93 % - Readily biodegradable

12.3 Bioaccumulative potential
Bioaccumulation Cyprinus carpio (Carp) - 0,5 mg/l
Bioconcentration factor (BCF): < 2,8 (OECD Test Guideline 305C)

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

12.6 Other adverse effects
Harmful to aquatic life.

SECTION 13: Disposal considerations

13.1 Waste treatment methods
Product
Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Offer surplus and non-recyclable solutions to a licensed disposal company.

Contaminated packaging
Dispose of as unused product.

SECTION 14: Transport information

14.1 UN number
ADR/RID: 2054 IMDG: 2054 IATA: 2054

14.2 UN proper shipping name
ADR/RID: MORPHOLINE IMDG: MORPHOLINE IATA: Morpholine

14.3 Transport hazard class(es)
ADR/RID: 8 (3) IMDG: 8 (3) IATA: 8 (3)

14.4 Packaging group
ADR/RID: I IMDG: I IATA: I

14.5 Environmental hazards
ADR/RID: no IMDG Marine pollutant: no IATA: no

14.6 Special precautions for user
No data available
SECTION 15: Regulatory information

This safety datasheet complies with the requirements of Regulation (EC) No. 453/2010.

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture

15.2 Chemical Safety Assessment
For this product a chemical safety assessment was not carried out

SECTION 16: Other information

Full text of H-Statements referred to under sections 2 and 3.

H226 Flammable liquid and vapour.
H302 Harmful if swallowed.
H311 Toxic in contact with skin.
H311 + H331 Toxic in contact with skin or if inhaled.
H314 Causes severe skin burns and eye damage.
H331 Toxic if inhaled.

Further information
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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.
SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers

Product name: Copper(I) chloride

Product Number: 651745
Brand: Aldrich
Index-No.: 029-001-00-4
REACH No.: A registration number is not available for this substance as the substance or its uses are exempted from registration, the annual tonnage does not require a registration or the registration is envisaged for a later registration deadline.
CAS-No.: 7758-89-6

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses: Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet

Company: Sigma-Aldrich Chemie GmbH
Riedstrasse 2
D-89555 STEINHEIM

Telephone: +49 89-6513-1444
Fax: +49 7329-97-2319
E-mail address: eurtechserv@sial.com

1.4 Emergency telephone number

Emergency Phone #: 0800 181 7059 (CHEMTREC Deutschand) +49 (0)696 43508409 (CHEMTREC weltweit)

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

Classification according to Regulation (EC) No 1272/2008
Acute toxicity, Oral (Category 4), H302
Skin irritation (Category 2), H315
Serious eye damage (Category 1), H318
Acute aquatic toxicity (Category 1), H400
Chronic aquatic toxicity (Category 1), H410

For the full text of the H-Statements mentioned in this Section, see Section 16.

Classification according to EU Directives 67/548/EEC or 1999/45/EC
N Dangerous for the environment R50/53
Xi Irritant R38, R41
Xn Harmful R22

For the full text of the R-phrases mentioned in this Section, see Section 16.

2.2 Label elements

Labelling according Regulation (EC) No 1272/2008
Pictogram

Signal word
Danger

Hazard statement(s)
H302 Harmful if swallowed.
H315 Causes skin irritation.
H318 Causes serious eye damage.
H410 Very toxic to aquatic life with long lasting effects.

Precautionary statement(s)
P273 Avoid release to the environment.
P280 Wear protective gloves/ eye protection/ face protection.
P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P501 Dispose of contents/ container to an approved waste disposal plant.

Supplemental Hazard Statements
none

2.3 Other hazards
This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

SECTION 3: Composition/information on ingredients

3.1 Substances
Synonyms: Cuprous chloride
Formula: CuCl
Molecular weight: 99.00 g/mol
CAS-No.: 7758-89-6
EC-No.: 231-842-9
Index-No.: 029-001-00-4

Hazardous ingredients according to Regulation (EC) No 1272/2008

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<thead>
<tr>
<th>Component</th>
<th>Classification</th>
<th>Concentration</th>
</tr>
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<tr>
<td>CAS-No.</td>
<td>7758-89-6</td>
<td>Acute Tox. 4; Skin Irrit. 2; Eye Dam. 1; Aquatic Acute 1; Aquatic Chronic 1; H302, H315, H318, H410</td>
</tr>
<tr>
<td>EC-No.</td>
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<td>&lt;= 100 %</td>
</tr>
<tr>
<td>Index-No.</td>
<td>029-001-00-4</td>
<td></td>
</tr>
</tbody>
</table>

Hazardous ingredients according to Directive 1999/45/EC

<table>
<thead>
<tr>
<th>Component</th>
<th>Classification</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cuprous chloride</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CAS-No.</td>
<td>7758-89-6</td>
<td>Xn, N, R22 - R50/53 - R38 - R41</td>
</tr>
<tr>
<td>EC-No.</td>
<td>231-842-9</td>
<td>&lt;= 100 %</td>
</tr>
<tr>
<td>Index-No.</td>
<td>029-001-00-4</td>
<td></td>
</tr>
</tbody>
</table>

For the full text of the H-Statements and R-Phrases mentioned in this Section, see Section 16

SECTION 4: First aid measures

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.
In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
Hydrogen chloride gas, Copper oxides

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
No data available

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
Use personal protective equipment. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust. For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up
Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid formation of dust and aerosols. Provide appropriate exhaust ventilation at places where dust is formed. For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Store in cool place. Keep container tightly closed in a dry and well-ventilated place.

Air, light, and moisture sensitive.
Storage class (TRGS 510): Non Combustible Solids

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated
SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Components with workplace control parameters

8.2 Exposure controls

Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove’s outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

The selected protective gloves have to satisfy the specifications of EU Directive 89/686/EEC and the standard EN 374 derived from it.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0,11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0,11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de,
test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.
SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a) Appearance Form: Beads
   Colour: beige

b) Odour No data available

c) Odour Threshold No data available

d) pH 5 at 50 g/l at 20 °C

e) Melting point/freezing point Melting point/range: 430 °C - lit.

f) Initial boiling point and boiling range 1.490 °C - lit.

g) Flash point Not applicable

h) Evaporation rate No data available

i) Flammability (solid, gas) No data available

j) Upper/lower flammability or explosive limits No data available

k) Vapour pressure 1,7 hPa at 546 °C

l) Vapour density No data available

m) Relative density 4,140 g/cm3

n) Water solubility 0,047 g/l at 20 °C - slightly soluble

o) Partition coefficient: n-octanol/water No data available

p) Auto-ignition temperature No data available

q) Decomposition temperature No data available

r) Viscosity No data available

s) Explosive properties No data available

t) Oxidizing properties No data available

9.2 Other safety information

Bulk density 1,7 g/l at 20 °C

SECTION 10: Stability and reactivity

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
Air Avoid moisture. Light.

10.5 Incompatible materials
Oxidizing agents, Alkali metals
10.6 **Hazardous decomposition products**
Other decomposition products - No data available
In the event of fire: see section 5

**SECTION 11: Toxicological information**

11.1 **Information on toxicological effects**

**Acute toxicity**
LD50 Oral - Rat - 336 mg/kg
LC50 Inhalation - Mouse - 1.008 mg/m³

**Skin corrosion/irritation**
Skin - Rabbit
Result: Irritating to skin.

**Serious eye damage/eye irritation**
Eyes - Rabbit
Result: Risk of serious damage to eyes.

**Respiratory or skin sensitisation**
Maximisation Test (GPMT) - Guinea pig
Does not cause skin sensitisation.
(OECD Test Guideline 406)

**Germ cell mutagenicity**
Rat
Ascites tumor
Cytogenetic analysis

**Carcinogenicity**
IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

**Reproductive toxicity**
No data available

**Specific target organ toxicity - single exposure**
No data available

**Specific target organ toxicity - repeated exposure**
No data available

**Aspiration hazard**
No data available

**Additional Information**
RTECS: GL6990000
Symptoms of systemic copper poisoning may include: capillary damage, headache, cold sweat, weak pulse, and kidney and liver damage, central nervous system excitation followed by depression, jaundice, convulsions, paralysis, and coma. Death may occur from shock or renal failure. Chronic copper poisoning is typified by hepatic cirrhosis, brain damage and demyelination, kidney defects, and copper deposition in the cornea as exemplified by humans with Wilson's disease. It has also been reported that copper poisoning has lead to hemolytic anemia and accelerates arteriosclerosis.

**SECTION 12: Ecological information**

12.1 **Toxicity**
Toxicity to fish
LC50 - Oncorhynchus mykiss (rainbow trout) - 0,05 - 0,36 mg/l - 96,0 h

12.2 **Persistence and degradability**
No data available
12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

12.6 Other adverse effects
Very toxic to aquatic life with long lasting effects.

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product
Offer surplus and non-recyclable solutions to a licensed disposal company. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Contaminated packaging
Dispose of as unused product.

SECTION 14: Transport information

14.1 UN number
ADR/RID: 2802
IMDG: 2802
IATA: 2802

14.2 UN proper shipping name
ADR/RID: COPPER CHLORIDE
IMDG: COPPER CHLORIDE
IATA: Copper chloride

14.3 Transport hazard class(es)
ADR/RID: 8
IMDG: 8
IATA: 8

14.4 Packaging group
ADR/RID: III
IMDG: III
IATA: III

14.5 Environmental hazards
ADR/RID: yes
IMDG Marine pollutant: yes
IATA: no

14.6 Special precautions for user
No data available

SECTION 15: Regulatory information

This safety datasheet complies with the requirements of Regulation (EC) No. 1907/2006.

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture
No data available

15.2 Chemical Safety Assessment
For this product a chemical safety assessment was not carried out

SECTION 16: Other information

Full text of H-Statements referred to under sections 2 and 3.

Acute Tox. Acute toxicity
Aquatic Acute Acute aquatic toxicity
Aquatic Chronic Chronic aquatic toxicity
Eye Dam. Serious eye damage
H302 Harmful if swallowed.
H315 Causes skin irritation.
H318 Causes serious eye damage.
H400 Very toxic to aquatic life.
H410 Very toxic to aquatic life with long lasting effects.

**Full text of R-phrases referred to under sections 2 and 3**

N Dangerous for the environment
Xn Harmful
R22 Harmful if swallowed.
R38 Irritating to skin.
R41 Risk of serious damage to eyes.
R50/53 Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

**Further information**

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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.
SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers
   Product name: Copper(II) sulfate pentahydrate
   Product Number: 209198
   Brand: Sigma-Aldrich
   Index-No.: 029-004-00-0
   REACH No.: A registration number is not available for this substance as the substance or its uses are exempted from registration, the annual tonnage does not require a registration or the registration is envisaged for a later registration deadline.
   CAS-No.: 7758-99-8

1.2 Relevant identified uses of the substance or mixture and uses advised against
   Identified uses: Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet
   Company: Sigma-Aldrich Chemie GmbH
   Riedstrasse 2
   D-89555 STEINHEIM
   Telephone: +49 89-6513-1444
   Fax: +49 7329-97-2319
   E-mail address: eurtechserv@sial.com

1.4 Emergency telephone number
   Emergency Phone #: 0800 181 7059 (CHEMTREC Deutschland)
   +49 (0)696 43508409 (CHEMTREC weltweit)

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture
   Classification according to Regulation (EC) No 1272/2008
   Acute toxicity, Oral (Category 4), H302
   Skin irritation (Category 2), H315
   Eye irritation (Category 2), H319
   Acute aquatic toxicity (Category 1), H400
   Chronic aquatic toxicity (Category 1), H410
   For the full text of the H-Statements mentioned in this Section, see Section 16.

   Classification according to EU Directives 67/548/EEC or 1999/45/EC
   Xn Harmful/R22
   Xi Irritant/R36/38
   N Dangerous for the environment/R50/53
   For the full text of the R-phrases mentioned in this Section, see Section 16.

2.2 Label elements
   Labelling according Regulation (EC) No 1272/2008
2.3 Other hazards

This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

SECTION 3: Composition/information on ingredients

3.1 Substances

Synonyms : Cupric sulphate pentahydrate

Formula : CuO₄S · 5H₂O
Molecular weight : 249.69 g/mol
CAS-No. : 7758-99-8
EC-No. : 231-847-6
Index-No. : 029-004-00-0

Hazardous ingredients according to Regulation (EC) No 1272/2008

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<th>Component</th>
<th>Classification</th>
<th>Concentration</th>
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</thead>
<tbody>
<tr>
<td>Copper sulphate pentahydrate</td>
<td>Acute Tox. 4; Skin Irrit. 2; Eye Irrit. 2; Aquatic Acute 1; Aquatic Chronic 1; H302, H315, H319, H410</td>
<td>&lt;= 100 %</td>
</tr>
</tbody>
</table>

Hazardous ingredients according to Directive 1999/45/EC

<table>
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<tr>
<th>Component</th>
<th>Classification</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Copper sulphate pentahydrate</td>
<td>Xn, N, R22 - R36/38 - R50/53</td>
<td>&lt;= 100 %</td>
</tr>
</tbody>
</table>

For the full text of the H-Statements and R-Phrases mentioned in this Section, see Section 16

SECTION 4: First aid measures

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.
In case of skin contact
Wash off with soap and plenty of water. Take victim immediately to hospital. Consult a physician.

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

SECTION 5: Firefighting measures

5.1 Extinguishing media
Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
Sulphur oxides, Copper oxides

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
No data available

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
Wear respiratory protection. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust. For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up
Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid formation of dust and aerosols. Provide appropriate exhaust ventilation at places where dust is formed. For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Store in cool place. Keep container tightly closed in a dry and well-ventilated place.
Air sensitive, hygroscopic Handle and store under inert gas. Storage class (TRGS 510): Non Combustible Solids

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated
SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Components with workplace control parameters

8.2 Exposure controls

Appropriate engineering controls
Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product.

Personal protective equipment

Eye/face protection
Face shield and safety glasses. Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove’s outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

The selected protective gloves have to satisfy the specifications of EU Directive 89/686/EEC and the standard EN 374 derived from it.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0,11 mm
Break through time: 480 min
Material tested: Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0,11 mm
Break through time: 480 min
Material tested: Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374

If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Complete suit protecting against chemicals. The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N99 (US) or type P2 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.
SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a) Appearance
Form: crystalline
Colour: blue

b) Odour
No data available

c) Odour Threshold
No data available

d) pH
3.7 - 4.5 at 50 g/l at 25 °C

e) Melting point/freezing point
Melting point/range: 110 °C - dec.

f) Initial boiling point and boiling range
No data available

g) Flash point
No data available

h) Evaporation rate
No data available

i) Flammability (solid, gas)
No data available

j) Upper/lower flammability or explosive limits
No data available

k) Vapour pressure
9.7 hPa at 25 °C

l) Vapour density
No data available

m) Relative density
2.284 g/cm³

n) Water solubility
No data available

o) Partition coefficient: n-octanol/water
No data available

p) Auto-ignition temperature
No data available

q) Decomposition temperature
No data available

r) Viscosity
No data available

s) Explosive properties
No data available

t) Oxidizing properties
No data available

9.2 Other safety information
No data available

SECTION 10: Stability and reactivity

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
Exposure to moisture

10.5 Incompatible materials
Powdered metals, Anhydrous copper(II) sulfate, reacts violently with; hydroxylamine, Magnesium
10.6 Hazardous decomposition products
Other decomposition products - No data available
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - 482 mg/kg
(OECD Test Guideline 401)
Remarks: anhydrous
LD50 Dermal - Rat - > 2.000 mg/kg
Remarks: anhydrous

Skin corrosion/irritation
Irritating to skin.

Serious eye damage/eye irritation
Irritating to eyes.

Respiratory or skin sensitisation
Prolonged or repeated exposure may cause allergic reactions in certain sensitive individuals.

Germ cell mutagenicity
No data available

Carcinogenicity
IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

Reproductive toxicity
No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

Additional Information
RTECS: GL8900000
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

SECTION 12: Ecological information

12.1 Toxicity
Toxicity to daphnia and other aquatic invertebrates
EC50 - Daphnia magna (Water flea) - 0,024 mg/l - 48 h

12.2 Persistence and degradability
The methods for determining the biological degradability are not applicable to inorganic substances.

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

12.6 Other adverse effects
Very toxic to aquatic life with long lasting effects.

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product
Offer surplus and non-recyclable solutions to a licensed disposal company. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Contaminated packaging
Dispose of as unused product.

SECTION 14: Transport information

14.1 UN number
ADR/RID: 3077          IMDG: 3077          IATA: 3077

14.2 UN proper shipping name
ADR/RID: ENVIRONIMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (Copper sulphate pentahydrate)
IMDG: ENVIRONIMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (Copper sulphate pentahydrate)
IATA: Environmentally hazardous substance, solid, n.o.s. (Copper sulphate pentahydrate)

14.3 Transport hazard class(es)
ADR/RID: 9          IMDG: 9          IATA: 9

14.4 Packaging group
ADR/RID: III          IMDG: III          IATA: III

14.5 Environmental hazards
ADR/RID: yes          IMDG Marine pollutant: yes          IATA: yes

14.6 Special precautions for user
No data available

SECTION 15: Regulatory information

This safety datasheet complies with the requirements of Regulation (EC) No. 1907/2006.

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture
No data available

15.2 Chemical Safety Assessment
For this product a chemical safety assessment was not carried out

SECTION 16: Other information

Full text of H-Statements referred to under sections 2 and 3.

Acute Tox.           Acute toxicity
Aquatic Acute        Acute aquatic toxicity
Aquatic Chronic      Chronic aquatic toxicity
Eye Irrit.           Eye irritation
H302                 Harmful if swallowed.
H315                 Causes skin irritation.
H319                 Causes serious eye irritation.
H400                 Very toxic to aquatic life.
Full text of R-phrases referred to under sections 2 and 3

N     Dangerous for the environment
Xn    Harmful
R22   Harmful if swallowed.
R36/38 Irritating to eyes and skin.
R50/53 Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

Further information
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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.
SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers

Product name: Methyl methacrylate

Product Number: M55909
Brand: Aldrich
Index-No.: 607-035-00-6
REACH No.: A registration number is not available for this substance as the substance or its uses are exempted from registration, the annual tonnage does not require a registration or the registration is envisaged for a later registration deadline.
CAS-No.: 80-62-6

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses: Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet

Company: Sigma-Aldrich Chemie GmbH
Riedstrasse 2
D-89555 STEINHEIM

Telephone: +49 89-6513-1444
Fax: +49 7329-97-2319
E-mail address: eurtechserv@sial.com

1.4 Emergency telephone number

Emergency Phone # 0800 181 7059 (CHEMTREC Deutschland)
+49 (0)696 43508409 (CHEMTREC weltweit)

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

Classification according to Regulation (EC) No 1272/2008
Flammable liquids (Category 2), H225
Skin irritation (Category 2), H315
Skin sensitisation (Category 1), H317
Specific target organ toxicity - single exposure (Category 3), Respiratory system, H335

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 Label elements

Labelling according Regulation (EC) No 1272/2008
Pictogram

Signal word: Danger
Hazard statement(s): Highly flammable liquid and vapour.
Precautionary statement(s)
P210 Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
P280 Wear protective gloves.
P370 + P378 In case of fire: Use dry powder or dry sand to extinguish.
P403 + P235 Store in a well-ventilated place. Keep cool.

Supplemental Hazard Statements

2.3 Other hazards
This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher. Lachrymator.

SECTION 3: Composition/information on ingredients

3.1 Substances

<table>
<thead>
<tr>
<th>Component</th>
<th>Classification</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAS-No.</td>
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<tr>
<td>Molecular weight</td>
<td>100.12 g/mol</td>
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<tr>
<td>EC-No.</td>
<td>80-62-6</td>
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<tr>
<td>Index-No.</td>
<td>201-297-1</td>
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</table>

Hazardous ingredients according to Regulation (EC) No 1272/2008

For the full text of the H-Statements mentioned in this Section, see Section 16.

SECTION 4: First aid measures

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11
4.3 Indication of any immediate medical attention and special treatment needed
No data available

SECTION 5: Firefighting measures

5.1 Extinguishing media
Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
Carbon oxides
Flash back possible over considerable distance., Container explosion may occur under fire conditions.

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
Use water spray to cool unopened containers.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
Use personal protective equipment. Avoid breathing vapours, mist or gas. Ensure adequate ventilation.
Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapours accumulating to
form explosive concentrations. Vapours can accumulate in low areas.
For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the
environment must be avoided.

6.3 Methods and materials for containment and cleaning up
Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and
place in container for disposal according to local regulations (see section 13).

6.4 Reference to other sections
For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.
Keep away from sources of ignition - No smoking. Take measures to prevent the build up of electrostatic
charge.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Store in cool place. Keep container tightly closed in a dry and well-ventilated place. Containers which are
opened must be carefully resealed and kept upright to prevent leakage.
Recommended storage temperature 2 - 8 °C
Storage class (TRGS 510): Flammable liquids

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated
SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Components with workplace control parameters

8.2 Exposure controls

Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

The selected protective gloves have to satisfy the specifications of EU Directive 89/686/EEC and the standard EN 374 derived from it.

Splash contact
Material: butyl-rubber
Minimum layer thickness: 0,3 mm
Break through time: 66 min
Material tested:Butoject® (KCL 897 / Aldrich Z677647, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de,
test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Complete suit protecting against chemicals, Flame retardant antistatic protective clothing. The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a) Appearance
   Form: liquid
   Colour: colourless

b) Odour
   Pungent

c) Odour Threshold
   No data available
9.2 Other safety information

Surface tension 28 mN/m at 20 °C
Relative vapour density 3.46 - (Air = 1.0)

SECTION 10: Stability and reactivity

10.1 Reactivity
No data available

10.2 Chemical stability
Polymerizes with evolution of heat. Avoid contact with incompatible materials. Unless inhibited, product can polymerize, raising temperature and pressure, possibly rupturing container. Check inhibitor content often adding to bulk liquid if needed. Do not blanket or mix with oxygen-free gas as it renders inhibitor ineffective. Stable under recommended storage conditions.
Contains the following stabiliser(s):
Mequino (<=0,003 %)

10.3 Possibility of hazardous reactions
Polymerises readily unless inhibited.

10.4 Conditions to avoid
May polymerize on exposure to light.
Heat, flames and sparks. Heat Extremes of temperature and direct sunlight.
Heat, flames and sparks.

10.5 Incompatible materials
Oxidizing agents, Peroxides, Amines, Bases, acids, Reducing agents, Halogens
10.6 Hazardous decomposition products
Other decomposition products - No data available
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - 7.900 mg/kg
LC50 Inhalation - Rat - 4 h - 78.000 mg/m3
LD50 Dermal - Rabbit - male - > 5.000 mg/kg
(OECD Test Guideline 402)

Skin corrosion/irritation
Skin - Rabbit
Result: Irritating to skin. - 4 h

Serious eye damage/eye irritation
Eyes - Rabbit
Result: No eye irritation

Respiratory or skin sensitisation
in vivo assay - Mouse
May cause allergic skin reaction.
(OECD Test Guideline 429)

Germ cell mutagenicity
No data available

Ames test
S. typhimurium
Result: negative

OECD Test Guideline 478
Mouse - male
Result: negative

Carcinogenicity
Carcinogenicity - Rat - male and female - Inhalation
No significant adverse effects were reported

This product is or contains a component that is not classifiable as to its carcinogenicity based on its IARC, ACGIH, NTP, or EPA classification.

IARC: 3 - Group 3: Not classifiable as to its carcinogenicity to humans (Methyl methacrylate)

Reproductive toxicity
No data available

Developmental Toxicity - Rat - Inhalation
No significant adverse effects were reported

Specific target organ toxicity - single exposure
May cause respiratory irritation.

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

Additional Information
Repeated dose Rat - male - Oral - NOAEL : >= 124,1 mg/kg
Central nervous system depression, Drowsiness, Irritability, Dizziness, Ataxia., narcosis, To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Liver - Irregularities - Based on Human Evidence

SECTION 12: Ecological information

12.1 Toxicity
Toxicity to fish  static test LC50 - Lepomis macrochirus (Bluegill) - 283 mg/l - 96 h
Toxicity to daphnia and other aquatic invertebrates  flow-through test EC50 - Daphnia magna (Water flea) - 69 mg/l - 48 h
Toxicity to algae  static test EC50 - Pseudokirchneriella subcapitata - > 110 mg/l - 72 h (OECD Test Guideline 201)

12.2 Persistence and degradability
Biodegradability  aerobic - Exposure time 14 d
Result: 94% - Readily biodegradable (OECD Test Guideline 301C)

12.3 Bioaccumulative potential
12.4 Mobility in soil
12.5 Results of PBT and vPvB assessment
This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

12.6 Other adverse effects
Harmful to aquatic life.

SECTION 13: Disposal considerations

13.1 Waste treatment methods
Product
Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Offer surplus and non-recyclable solutions to a licensed disposal company.

Contaminated packaging
Dispose of as unused product.

SECTION 14: Transport information

14.1 UN number
ADR/RID: 1247
IMDG: 1247
IATA: 1247

14.2 UN proper shipping name
ADR/RID: METHYL METHACRYLATE MONOMER, STABILIZED
IMDG: METHYL METHACRYLATE MONOMER, STABILIZED
IATA: Methyl methacrylate monomer, stabilized

14.3 Transport hazard class(es)
ADR/RID: 3
IMDG: 3
IATA: 3

14.4 Packaging group
ADR/RID: II
IMDG: II
IATA: II

14.5 Environmental hazards
ADR/RID: no
IMDG Marine pollutant: no
IATA: no
14.6 Special precautions for user
No data available

SECTION 15: Regulatory information
This safety datasheet complies with the requirements of Regulation (EC) No. 453/2010.

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture

15.2 Chemical Safety Assessment
For this product a chemical safety assessment was not carried out

SECTION 16: Other information

Full text of H-Statements referred to under sections 2 and 3.
H225 Highly flammable liquid and vapour.
H315 Causes skin irritation.
H317 May cause an allergic skin reaction.
H335 May cause respiratory irritation.

Further information
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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.
SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers
   Product name: 1-Methyl-2-pyrrolidinone

   Product Number: 328634
   Brand: Sigma-Aldrich
   Index-No.: 606-021-00-7
   REACH No.: 01-2119472430-46-XXXX
   CAS-No.: 872-50-4

1.2 Relevant identified uses of the substance or mixture and uses advised against
   Identified uses: Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet
   Company: Sigma-Aldrich Chemie GmbH
   Riedstrasse 2
   D-89555 STEINHEIM
   Telephone: +49 89-6513-1444
   Fax: +49 7329-97-2319
   E-mail address: eurtechserv@sigal.com

1.4 Emergency telephone number
   Emergency Phone #: 0800 181 7059 (CHEMTREC Deutschland)
   +49 (0)696 43508409 (CHEMTREC weltweit)

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

   Classification according to Regulation (EC) No 1272/2008
   Skin irritation (Category 2), H315
   Eye irritation (Category 2), H319
   Reproductive toxicity (Category 1B), H360
   Specific target organ toxicity - single exposure (Category 3), Respiratory system, H335

   For the full text of the H-Statements mentioned in this Section, see Section 16.

   Classification according to EU Directives 67/548/EEC or 1999/45/EC
   R61
   Xi Irritant
   R36/37/38

   For the full text of the R-phrases mentioned in this Section, see Section 16.

2.2 Labelling elements

   Labelling according Regulation (EC) No 1272/2008
   Pictogram

   Signal word: Danger

   Hazard statement(s)
   H315 Causes skin irritation.
   H319 Causes serious eye irritation.
H335 May cause respiratory irritation.
H360 May damage fertility or the unborn child.

Precautionary statement(s)
P201 Obtain special instructions before use.
P280 Wear eye protection/ face protection.
P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P308 + P313 IF exposed or concerned: Get medical advice/ attention.
P337 + P313 If eye irritation persists: Get medical advice/ attention.

Supplemental Hazard Statements

Restricted to professional users.

2.3 Other hazards
This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

SECTION 3: Composition/information on ingredients

3.1 Substances
Synonyms : N-Methyl-2-pyrrolidone
            1-Methyl-2-pyrrolidone
            NMP
            M-PYROL™

Formula : C₅H₇NO
Molecular weight : 99,13 g/mol
CAS-No. : 872-50-4
EC-No. : 212-828-1
Index-No. : 606-021-00-7
Registration number : 01-2119472430-46-XXXX

Hazardous ingredients according to Regulation (EC) No 1272/2008

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<th>Component</th>
<th>Classification</th>
<th>Concentration</th>
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</thead>
<tbody>
<tr>
<td>N-methyl-2-pyrrolidone</td>
<td>Skin Irrit. 2; Eye Irrit. 2; Repr. 1B; STOT SE 3; H315, H319, H335, H360</td>
<td>&lt;= 100 %</td>
</tr>
<tr>
<td>CAS-No.</td>
<td>872-50-4</td>
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<tr>
<td>EC-No.</td>
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</tr>
<tr>
<td>Registration number</td>
<td>01-2119472430-46-XXXX</td>
<td></td>
</tr>
</tbody>
</table>

Hazardous ingredients according to Directive 1999/45/EC

<table>
<thead>
<tr>
<th>Component</th>
<th>Classification</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>N-methyl-2-pyrrolidone</td>
<td>T, Repr.Cat.2, R61 - R36/37/38</td>
<td>&lt;= 100 %</td>
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<td>CAS-No.</td>
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</tr>
</tbody>
</table>

For the full text of the H-Statements and R-Phrases mentioned in this Section, see Section 16

SECTION 4: First aid measures

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.
4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
Carbon oxides, Nitrogen oxides (NOx)

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
Use water spray to cool unopened containers.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
Use personal protective equipment. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapours accumulating to form explosive concentrations. Vapours can accumulate in low areas. For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

6.3 Methods and materials for containment and cleaning up
Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations (see section 13). Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling
Avoid exposure - obtain special instructions before use. Avoid contact with skin and eyes. Avoid inhalation of vapour or mist. Keep away from sources of ignition - No smoking. Take measures to prevent the build up of electrostatic charge. For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Store in cool place. Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.
Store under inert gas. Moisture sensitive.
Storage class (TRGS 510): Non-combustible, acute toxic Cat.3 / toxic hazardous materials or hazardous materials causing chronic effects

### 7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

---

**SECTION 8: Exposure controls/personal protection**

#### 8.1 Control parameters

**Components with workplace control parameters**

<table>
<thead>
<tr>
<th>Application Area</th>
<th>Exposure routes</th>
<th>Health effect</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Workers</td>
<td>Skin contact</td>
<td>Acute systemic effects</td>
<td>208mg/kg BW/d</td>
</tr>
<tr>
<td>Workers</td>
<td>Inhalation</td>
<td>Acute systemic effects</td>
<td>80 mg/m3</td>
</tr>
<tr>
<td>Workers</td>
<td>Skin contact</td>
<td>Long-term systemic effects</td>
<td>19.8mg/kg BW/d</td>
</tr>
<tr>
<td>Workers</td>
<td>Inhalation</td>
<td>Long-term systemic effects</td>
<td>40 mg/m3</td>
</tr>
</tbody>
</table>

**Derived No Effect Level (DNEL)**

#### 8.2 Exposure controls

**Appropriate engineering controls**
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

**Personal protective equipment**

**Eye/face protection**
Safety glasses with side-shields conforming to EN166 Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

**Skin protection**
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove’s outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

The selected protective gloves have to satisfy the specifications of EU Directive 89/686/EEC and the standard EN 374 derived from it.

**Full contact**
Material: butyl-rubber
Minimum layer thickness: 0,3 mm
Break through time: 480 min
Material tested: Butoject® (KCL 897 / Aldrich Z677647, Size M)

**Splash contact**
Material: Nature latex/chloroprene
Minimum layer thickness: 0,6 mm
Break through time: 35 min
Material tested: Lapren® (KCL 706 / Aldrich Z677558, Size M)
Body Protection
Impervious clothing. The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a) Appearance
   Form: liquid
   Colour: colourless

b) Odour
   No data available

c) Odour Threshold
   No data available

d) pH
   7,7 - 8

e) Melting point/freezing point
   Melting point/range: -24 °C

f) Initial boiling point and boiling range
   202 °C
   81 - 82 °C at 13 hPa

g) Flash point
   91 °C - closed cup

h) Evaporation rate
   No data available

i) Flammability (solid, gas)
   No data available

j) Upper/lower flammability or explosive limits
   Upper explosion limit: 9.5 % (V)
   Lower explosion limit: 1.3 % (V)

k) Vapour pressure
   0.39 - 0.43 hPa at 20 °C
   1.32 hPa at 40 °C

l) Vapour density
   3.42 - (Air = 1.0)

m) Relative density
   1.028 g/mL at 25 °C

n) Water solubility
   No data available

o) Partition coefficient: n-octanol/water
   log Pow: -0.46

p) Auto-ignition temperature
   No data available

q) Decomposition temperature
   No data available

r) Viscosity
   No data available

s) Explosive properties
   No data available
9.2 Other safety information

Surface tension 40.7 mN/m
Relative vapour density 3.42 - (Air = 1.0)

SECTION 10: Stability and reactivity

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
Heat, flames and sparks.

10.5 Incompatible materials
Strong acids, Strong oxidizing agents, Strong reducing agents

10.6 Hazardous decomposition products
Other decomposition products - No data available
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - 3.914 mg/kg
LD50 Inhalation - Rat - 4 h - > 5100 ppm
LD50 Dermal - Rabbit - 8.000 mg/kg

Skin corrosion/irritation
Classified according to Regulation (EU) 1272/2008, Annex VI (Table 3.1/3.2)

Serious eye damage/eye irritation
Eyes - Rabbit
Result: Eye irritation

Respiratory or skin sensitisation
No data available

Germ cell mutagenicity
No data available

Carcinogenicity
IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

Reproductive toxicity
Damage to fetus possible

Specific target organ toxicity - single exposure
Inhalation - May cause respiratory irritation.

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available
Additional Information
RTECS: UY5790000

prolonged or repeated exposure can cause:; Vomiting, Diarrhoea, Abdominal pain, Rats exposed to 1-methyl-2-pyrrolidinone at a concentration of 1 mg/L as an aerosol for 10 days showed depletion of hematopoietic cells in the bone marrow and atrophy of the lymphoid tissues of the thymus, spleen, and lymph nodes.

Bone marrow - Irregularities - Based on Human Evidence

SECTION 12: Ecological information

12.1 Toxicity
Toxicity to fish
LC50 - other fish - 4.000 mg/l - 96 h
LC50 - Leuciscus idus (Golden orfe) - > 500 mg/l - 96 h
Toxicity to daphnia and other aquatic invertebrates
EC50 - Daphnia magna (Water flea) - > 1.000 mg/l - 24 h
Toxicity to bacteria
LC50 - Bacteria - > 9.000 mg/l

12.2 Persistence and degradability
Biodegradability Result: 90 % - Readily biodegradable

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

12.6 Other adverse effects
No data available

SECTION 13: Disposal considerations

13.1 Waste treatment methods
Product
This combustible material may be burned in a chemical incinerator equipped with an afterburner and scrubber. Offer surplus and non-recyclable solutions to a licensed disposal company.

Contaminated packaging
Dispose of as unused product.

SECTION 14: Transport information

14.1 UN number
ADR/RID: - IMDG: - IATA: -

14.2 UN proper shipping name
ADR/RID: Not dangerous goods IMDG: Not dangerous goods IATA: Not dangerous goods

14.3 Transport hazard class(es)
ADR/RID: - IMDG: - IATA: -

14.4 Packaging group
ADR/RID: - IMDG: - IATA: -

14.5 Environmental hazards
ADR/RID: no IMDG Marine pollutant: no IATA: no
14.6 Special precautions for user
No data available

SECTION 15: Regulatory information
This safety datasheet complies with the requirements of Regulation (EC) No. 1907/2006.

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture

Authorisations and/or restrictions on use
N-methyl-2-pyrrolidone CAS-No.: 872-50-4
REACH - Candidate List of Substances of Very High Concern for Authorisation (Article 59).
Toxic for reproduction (article 57c)
ED/31/2011

15.2 Chemical Safety Assessment
A Chemical Safety Assessment has been carried out for this substance.

SECTION 16: Other information

Full text of H-Statements referred to under sections 2 and 3.
Eye Irrit. Eye irritation
H315 Causes skin irritation.
H319 Causes serious eye irritation.
H335 May cause respiratory irritation.
H360 May damage fertility or the unborn child.
Repr. Reproductive toxicity
Skin Irrit. Skin irritation
STOT SE Specific target organ toxicity - single exposure

Full text of R-phrases referred to under sections 2 and 3
T Toxic
R36/37/38 Irritating to eyes, respiratory system and skin.
R61 May cause harm to the unborn child.
Repr.Cat.2 Toxic to Reproduction Category 2

Further information
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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.
SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers
Product name : Carbon

Product Number : 484164
Brand : Aldrich
REACH No. : A registration number is not available for this substance as the substance or its uses are exempted from registration, the annual tonnage does not require a registration or the registration is envisaged for a later registration deadline.
CAS-No. : 7440-44-0

1.2 Relevant identified uses of the substance or mixture and uses advised against
Identified uses : Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet
Company : Sigma-Aldrich Chemie GmbH
Riedstrasse 2
D-89555 STEINHEIM
Telephone : +49 89-6513-1444
Fax : +49 7329-97-2319
E-mail address : eurtechserv@sial.com

1.4 Emergency telephone number
Emergency Phone # : 0800 181 7059 (CHEMTREC Deutschland)
+49 (0)696 43508409 (CHEMTREC weltweit)

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture
Not a hazardous substance or mixture according to Regulation (EC) No. 1272/2008. This substance is not classified as dangerous according to Directive 67/548/EEC.

2.2 Label elements
The product does not need to be labelled in accordance with EC directives or respective national laws.

2.3 Other hazards - none

SECTION 3: Composition/information on ingredients

3.1 Substances
Synonyms : Charcoal activated

Formula : C
Molecular Weight : 12.01 g/mol
CAS-No. : 7440-44-0
EC-No. : 231-153-3

No components need to be disclosed according to the applicable regulations.
SECTION 4: First aid measures

4.1 Description of first aid measures

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration.

In case of skin contact
Wash off with soap and plenty of water.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
no data available

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
no data available

5.3 Advice for firefighters
Wear self contained breathing apparatus for fire fighting if necessary.

5.4 Further information
no data available

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
Avoid dust formation. Avoid breathing vapours, mist or gas.
For personal protection see section 8.

6.2 Environmental precautions
No special environmental precautions required.

6.3 Methods and materials for containment and cleaning up
Sweep up and shovel. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling
Provide appropriate exhaust ventilation at places where dust is formed.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Store in cool place. Keep container tightly closed in a dry and well-ventilated place.

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated
SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Components with workplace control parameters

8.2 Exposure controls

Appropriate engineering controls
General industrial hygiene practice.

Personal protective equipment

**Eye/face protection**
Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

**Skin protection**
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove’s outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

The selected protective gloves have to satisfy the specifications of EU Directive 89/686/EEC and the standard EN 374 derived from it.

**Full contact**
Material: Nitrile rubber
Minimum layer thickness: 0,11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

**Splash contact**
Material: Nitrile rubber
Minimum layer thickness: 0,11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de,
test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

**Body Protection**
Choose body protection in relation to its type, to the concentration and amount of dangerous substances, and to the specific work-place. The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

**Respiratory protection**
Respiratory protection is not required. Where protection from nuisance levels of dusts are desired, use type N95 (US) or type P1 (EN 143) dust masks. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

**Control of environmental exposure**
No special environmental precautions required.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a) Appearance
   Form: powder, granules
   Colour: black

b) Odour
   odourless
c) Odour Threshold  no data available

d) pH  6.0 - 9 at 40 g/l at 25 °C

e) Melting point/freezing point  Melting point/range: 3.550 °C - lit.

f) Initial boiling point and boiling range  no data available

g) Flash point  no data available

h) Evaporation rate  no data available

i) Flammability (solid, gas)  no data available

j) Upper/lower flammability or explosive limits  no data available

k) Vapour pressure  < 0.01 hPa at 20 °C

l) Vapour density  no data available

m) Relative density  0.250 - 0.600 g/cm³

n) Water solubility  insoluble

o) Partition coefficient: n-octanol/water  no data available

p) Auto-ignition temperature  no data available

q) Decomposition temperature  no data available

r) Viscosity  no data available

s) Explosive properties  no data available

t) Oxidizing properties  no data available

9.2 Other safety information

Bulk density  250 - 550 kg/m³ at 20 °C

SECTION 10: Stability and reactivity

10.1 Reactivity

no data available

10.2 Chemical stability

Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions

no data available

10.4 Conditions to avoid

no data available

10.5 Incompatible materials

Strong oxidizing agents

10.6 Hazardous decomposition products

Other decomposition products - no data available
In the event of fire: see section 5
SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
no data available
LD50 Intravenous - mouse - 440 mg/kg

Skin corrosion/irritation
no data available

Serious eye damage/eye irritation
no data available

Respiratory or skin sensitisation
no data available

Germ cell mutagenicity
no data available

Carcinogenicity
IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

Reproductive toxicity
no data available

Specific target organ toxicity - single exposure
no data available

Specific target organ toxicity - repeated exposure
no data available

Aspiration hazard
no data available

Additional Information
RTECS: FF5250100
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

SECTION 12: Ecological information

12.1 Toxicity
no data available

12.2 Persistence and degradability
no data available

12.3 Bioaccumulative potential
no data available

12.4 Mobility in soil
no data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects
no data available
SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product
Offer surplus and non-recyclable solutions to a licensed disposal company.

Contaminated packaging
Dispose of as unused product.

SECTION 14: Transport information

14.1 UN number
ADR/RID: - IMGD: - IATA: -

14.2 UN proper shipping name
ADR/RID: Not dangerous goods IMGD: Not dangerous goods IATA: Not dangerous goods

14.3 Transport hazard class(es)
ADR/RID: - IMGD: - IATA: -

14.4 Packaging group
ADR/RID: - IMGD: - IATA: -

14.5 Environmental hazards
ADR/RID: no IMGD Marine pollutant: no IATA: no

14.6 Special precautions for user
no data available

SECTION 15: Regulatory information

This safety datasheet complies with the requirements of Regulation (EC) No. 1907/2006.

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture

no data available

15.2 Chemical Safety Assessment
For this product a chemical safety assessment was not carried out

SECTION 16: Other information

Further information
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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.
SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers
   Product name: Sodium hexafluorosilicate
   Product Number: 250171
   Brand: Aldrich
   Index-No.: 009-012-00-0
   REACH No.: A registration number is not available for this substance as the substance or its uses are exempted from registration, the annual tonnage does not require a registration or the registration is envisaged for a later registration deadline.
   CAS-No.: 16893-85-9

1.2 Relevant identified uses of the substance or mixture and uses advised against
   Identified uses: Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet
   Company: Sigma-Aldrich Chemie GmbH
   Riedstrasse 2
   D-89555 STEINHEIM
   Telephone: +49 89-6513-1444
   Fax: +49 7329-97-2319
   E-mail address: eurtechserv@sial.com

1.4 Emergency telephone number
   Emergency Phone #
   0800 181 7059 (CHEMTREC Deutschland)
   +49 (0)696 43508409 (CHEMTREC weltweit)

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture
   Classification according to Regulation (EC) No 1272/2008
   Acute toxicity, Oral (Category 3), H301
   Acute toxicity, Inhalation (Category 3), H331
   Acute toxicity, Dermal (Category 3), H311
   For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 Label elements
   Labelling according Regulation (EC) No 1272/2008
   Pictogram

   Signal word: Danger
   Hazard statement(s)
   H301 + H311 + H331: Toxic if swallowed, in contact with skin or if inhaled
Precautionary statement(s)
P261 Avoid breathing dust.
P280 Wear protective gloves/ protective clothing.
P301 + P310 IF SWALLOWED: Immediately call a POISON CENTER/doctor.
P311 Call a POISON CENTER /doctor.

Supplemental Hazard Statements

2.3 Other hazards
This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

SECTION 3: Composition/information on ingredients

3.1 Substances
Formula : F₆Na₂Si
Molecular weight : 188,06 g/mol
CAS-No. : 16893-85-9
EC-No. : 240-934-8
Index-No. : 009-012-00-0

Hazardous ingredients according to Regulation (EC) No 1272/2008

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<th>Classification</th>
<th>Concentration</th>
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<td>Acute Tox. 3; H301, H331, H311</td>
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<td>EC-No.</td>
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<td>Index-No.</td>
<td>009-012-00-0</td>
<td></td>
</tr>
</tbody>
</table>

For the full text of the H-Statements mentioned in this Section, see Section 16.

SECTION 4: First aid measures

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance. Hydrofluoric (HF) acid burns require immediate and specialized first aid and medical treatment. Symptoms may be delayed up to 24 hours depending on the concentration of HF. After decontamination with water, further damage can occur due to penetration/absorption of the fluoride ion. Treatment should be directed toward binding the fluoride ion as well as the effects of exposure. Skin exposures can be treated with a 2.5% calcium gluconate gel repeated until burning ceases. More serious skin exposures may require subcutaneous calcium gluconate except for digital areas unless the physician is experienced in this technique, due to the potential for tissue injury from increased pressure. Absorption can readily occur through the subungual areas and should be considered when undergoing decontamination. Prevention of absorption of the fluoride ion in cases of ingestion can be obtained by giving milk, chewable calcium carbonate tablets or Milk of Magnesia to conscious victims. Conditions such as hypocalcemia, hypomagnesemia and cardiac arrhythmias should be monitored for, since they can occur after exposure.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Take victim immediately to hospital. Consult a physician. First treatment with calcium gluconate paste.

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.
If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

SECTION 5: Firefighting measures

5.1 Extinguishing media
Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
No data available

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
No data available

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
Wear respiratory protection. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust. For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up
Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid formation of dust and aerosols. Provide appropriate exhaust ventilation at places where dust is formed. For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Store in cool place. Keep container tightly closed in a dry and well-ventilated place. Storage class (TRGS 510): Non-combustible, acute toxic Cat.3 / toxic hazardous materials or hazardous materials causing chronic effects

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated
SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Components with workplace control parameters

8.2 Exposure controls

Appropriate engineering controls
Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product.

Personal protective equipment

Eye/face protection
Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove’s outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

The selected protective gloves have to satisfy the specifications of EU Directive 89/686/EEC and the standard EN 374 derived from it.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Complete suit protecting against chemicals. The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N99 (US) or type P2 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.
SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a) Appearance
   Form: powder
   Colour: white

b) Odour
   Odourless

c) Odour Threshold
   No data available

d) pH
   3,0 - 4,0 at 50 g/l at 20 °C

e) Melting point/freezing point
   No data available

f) Initial boiling point and boiling range
   No data available

g) Flash point
   No data available

h) Evaporation rate
   No data available

i) Flammability (solid, gas)
   No data available

j) Upper/lower flammability or explosive limits
   No data available

k) Vapour pressure
   No data available

l) Vapour density
   No data available

m) Relative density
   2,68 g/mL at 25 °C

n) Water solubility
   0,65 g/l at 17 °C - insoluble

o) Partition coefficient: n-octanol/water
   No data available

p) Auto-ignition temperature
   No data available

q) Decomposition temperature
   No data available

r) Viscosity
   No data available

s) Explosive properties
   No data available

t) Oxidizing properties
   No data available

9.2 Other safety information

Bulk density 1.000 g/l

SECTION 10: Stability and reactivity

10.1 Reactivity
   No data available

10.2 Chemical stability
   Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
   No data available

10.4 Conditions to avoid
   No data available

10.5 Incompatible materials
   Strong oxidizing agents
10.6 Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Hydrogen fluoride, Sodium oxides, silicon oxides
Other decomposition products - No data available
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rabbit - 125 mg/kg
LD50 Oral - Rat - 125 mg/kg
LD50 Oral - Mouse - 70 mg/kg

Skin corrosion/irritation
Skin - Rabbit
Result: No skin irritation

Serious eye damage/eye irritation
Eyes - Rabbit
Result: Mild eye irritation
(OECD Test Guideline 437)

Respiratory or skin sensitisation
No data available

Germ cell mutagenicity
No data available

Carcinogenicity
This product is or contains a component that is not classifiable as to its carcinogenicity based on its IARC, ACGIH, NTP, or EPA classification.

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

Reproductive toxicity
No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

Additional Information
RTECS: VV8410000
Fluoride ion can reduce serum calcium levels possibly causing fatal hypocalcemia.
A dose of about 1 gram can cause; Nausea, burning sensation, sores in the mouth, Lesions of the; Throat., sores in the digestive tract, Tremors, Convulsions, Shock., Death may result from ingestion of two to five grams., Prolonged or repeated exposure may cause; Increased; bone density, calcium deposits in the ligaments, new bone growth, Vomiting, Diarrhoea, Abdominal pain, To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.
SECTION 12: Ecological information

12.1 Toxicity
   Toxicity to fish  LC50 - Lepomis macrochirus - 49 mg/l - 96 h

12.2 Persistence and degradability
   No data available

12.3 Bioaccumulative potential
   No data available

12.4 Mobility in soil
   No data available

12.5 Results of PBT and vPvB assessment
   This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

12.6 Other adverse effects
   Harmful to aquatic life with long lasting effects.
   No data available

SECTION 13: Disposal considerations

13.1 Waste treatment methods
   Product
   Offer surplus and non-recyclable solutions to a licensed disposal company. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.
   Contaminated packaging
   Dispose of as unused product.

SECTION 14: Transport information

14.1 UN number
   ADR/RID: 2674  IMDG: 2674  IATA: 2674

14.2 UN proper shipping name
   ADR/RID: SODIUM FLUOROSILICATE
   IMDG: SODIUM FLUOROSILICATE
   IATA: Sodium fluorosilicate

14.3 Transport hazard class(es)
   ADR/RID: 6.1  IMDG: 6.1  IATA: 6.1

14.4 Packaging group
   ADR/RID: III  IMDG: III  IATA: III

14.5 Environmental hazards
   ADR/RID: no  IMDG Marine pollutant: no  IATA: no

14.6 Special precautions for user
   No data available

SECTION 15: Regulatory information

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture
   This safety datasheet complies with the requirements of Regulation (EC) No. 1907/2006.

15.2 Chemical safety assessment
   For this product a chemical safety assessment was not carried out
SECTION 16: Other information

Full text of H-Statements referred to under sections 2 and 3.

H301  Toxic if swallowed.
H301 + H311  Toxic if swallowed, in contact with skin or if inhaled
H331  Toxic in contact with skin.
H331  Toxic if inhaled.

Further information
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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.
SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers

Product name: Sodium thiosulfate

Product Number: 72049
Brand: Sigma-Aldrich
REACH No.: A registration number is not available for this substance as the substance or its uses are exempted from registration, the annual tonnage does not require a registration or the registration is envisaged for a later registration deadline.
CAS-No.: 7772-98-7

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses: Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet

Company: Sigma-Aldrich Chemie GmbH
Riedstrasse 2
D-89555 STEINHEIM

Telephone: +49 89-6513-1444
Fax: +49 7329-97-2319
E-mail address: eurtechserv@sial.com

1.4 Emergency telephone number

Emergency Phone #: 0800 181 7059 (CHEMTREC Deutschland)
+49 (0)696 43508409 (CHEMTREC weltweit)

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

Not a hazardous substance or mixture according to Regulation (EC) No. 1272/2008. This substance is not classified as dangerous according to Directive 67/548/EEC.

2.2 Label elements

The product does not need to be labelled in accordance with EC directives or respective national laws.

2.3 Other hazards - none

SECTION 3: Composition/information on ingredients

3.1 Substances

Synonyms: Sodium thiosulphate

Formula: Na₂O₃S₂
Molecular Weight: 158.11 g/mol
CAS-No.: 7772-98-7
EC-No.: 231-867-5

No components need to be disclosed according to the applicable regulations.
SECTION 4: First aid measures

4.1 Description of first aid measures

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration.

In case of skin contact
Wash off with soap and plenty of water.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
no data available

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
no data available

5.3 Advice for firefighters
Wear self contained breathing apparatus for fire fighting if necessary.

5.4 Further information
no data available

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
Avoid dust formation. Avoid breathing vapours, mist or gas.
For personal protection see section 8.

6.2 Environmental precautions
Do not let product enter drains.

6.3 Methods and materials for containment and cleaning up
Sweep up and shovel. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling
Provide appropriate exhaust ventilation at places where dust is formed.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Store in cool place. Keep container tightly closed in a dry and well-ventilated place.
Do not store near acids.
Keep in a dry place.

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated
SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Components with workplace control parameters

8.2 Exposure controls

Appropriate engineering controls
General industrial hygiene practice.

Personal protective equipment

Eye/face protection
Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove’s outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

The selected protective gloves have to satisfy the specifications of EU Directive 89/686/EEC and the standard EN 374 derived from it.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0,11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0,11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Choose body protection in relation to its type, to the concentration and amount of dangerous substances, and to the specific work-place., The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Respiratory protection is not required. Where protection from nuisance levels of dusts are desired, use type N95 (US) or type P1 (EN 143) dust masks. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Do not let product enter drains.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a) Appearance
Form: powder
Colour: white

b) Odour
no data available
c) Odour Threshold  no data available

d) pH 6.0 - 8.5 at 50 g/l at 20 °C

e) Melting point/freezing point 52 °C - Decomposes on heating.

f) Initial boiling point and boiling range  no data available

g) Flash point  no data available

h) Evaporation rate  no data available

i) Flammability (solid, gas)  no data available

j) Upper/lower flammability or explosive limits  no data available

k) Vapour pressure  no data available

l) Vapour density  no data available

m) Relative density 1.667 g/cm3 at 20 °C

n) Water solubility 210 g/l at 20 °C

o) Partition coefficient: n-octanol/water  no data available

p) Auto-ignition temperature  no data available

q) Decomposition temperature  no data available

r) Viscosity  no data available

s) Explosive properties  no data available

t) Oxidizing properties  no data available

9.2 Other safety information
no data available

SECTION 10: Stability and reactivity

10.1 Reactivity
no data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
no data available

10.4 Conditions to avoid
no data available

10.5 Incompatible materials
Strong acids, Strong oxidizing agents

10.6 Hazardous decomposition products
Other decomposition products - no data available
In the event of fire: see section 5
SECTION 11: Toxicological information

11.1 Information on toxicological effects

**Acute toxicity**
LD50 Oral - rat - > 8.000 mg/kg
LD50 Intraperitoneal - mouse - 5.200 mg/kg

**Skin corrosion/irritation**
no data available

**Serious eye damage/eye irritation**
no data available

**Respiratory or skin sensitisation**
no data available

**Germ cell mutagenicity**
no data available

**Carcinogenicity**
IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

**Reproductive toxicity**
no data available

**Specific target organ toxicity - single exposure**
no data available

**Specific target organ toxicity - repeated exposure**
no data available

**Aspiration hazard**
no data available

**Additional Information**
RTECS: XN6476000
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

SECTION 12: Ecological information

12.1 **Toxicity**
Toxicity to fish LC50 - Gambusia affinis (Mosquito fish) - 24.000 mg/l - 96 h

12.2 **Persistence and degradability**
no data available

12.3 **Bioaccumulative potential**
no data available

12.4 **Mobility in soil**
no data available

12.5 **Results of PBT and vPvB assessment**
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 **Other adverse effects**
no data available
SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product
Offer surplus and non-recyclable solutions to a licensed disposal company.

Contaminated packaging
Dispose of as unused product.

SECTION 14: Transport information

14.1 UN number
ADR/RID: - IMDG: - IATA: -

14.2 UN proper shipping name
ADR/RID: Not dangerous goods IMDG: Not dangerous goods IATA: Not dangerous goods

14.3 Transport hazard class(es)
ADR/RID: - IMDG: - IATA: -

14.4 Packaging group
ADR/RID: - IMDG: - IATA: -

14.5 Environmental hazards
ADR/RID: no IMDG Marine pollutant: no IATA: no

14.6 Special precautions for user
no data available

SECTION 15: Regulatory information

This safety datasheet complies with the requirements of Regulation (EC) No. 1907/2006.

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture
no data available

15.2 Chemical Safety Assessment
For this product a chemical safety assessment was not carried out

SECTION 16: Other information

Further information
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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.
SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers

Product name: N-Phenyl-1-naphthylamine

Product Number: 104043
Brand: Sigma-Aldrich
REACH No.: A registration number is not available for this substance as the substance or its uses are exempted from registration, the annual tonnage does not require a registration or the registration is envisaged for a later registration deadline.

CAS-No.: 90-30-2

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses: Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet

Company: Sigma-Aldrich Chemie GmbH
Riedstrasse 2
D-89555 STEINHEIM

Telephone: +49 89-6513-1444
Fax: +49 7329-97-2319
E-mail address: eurtechserv@sial.com

1.4 Emergency telephone number

Emergency Phone #: 0800 181 7059 (CHEMTREC Deutschland)
+49 (0)696 43508409 (CHEMTREC weltweit)

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

Classification according to Regulation (EC) No 1272/2008
Acute toxicity, Oral (Category 4), H302
Skin sensitisation (Category 1), H317
Specific target organ toxicity - repeated exposure (Category 2), H373
Acute aquatic toxicity (Category 1), H400
Chronic aquatic toxicity (Category 1), H410

For the full text of the H-Statements mentioned in this Section, see Section 16.

Classification according to EU Directives 67/548/EEC or 1999/45/EC
Xn, N Harmful, Dangerous for the R22, R43, R50/53 environment

For the full text of the R-phrases mentioned in this Section, see Section 16.

2.2 Label elements

Labelling according Regulation (EC) No 1272/2008

Pictogram

Signal word: Warning
Hazard statement(s)
H302 Harmful if swallowed.
H317 May cause an allergic skin reaction.
H373 May cause damage to organs through prolonged or repeated exposure.
H410 Very toxic to aquatic life with long lasting effects.

Precautionary statement(s)
P273 Avoid release to the environment.
P280 Wear protective gloves.
P501 Dispose of contents/container to an approved waste disposal plant.

Supplemental Hazard Statements
none

2.3 Other hazards
This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

SECTION 3: Composition/information on ingredients

3.1 Substances
Synonyms: N-(1-Naphthyl)aniiline
1-(N-phenylamino)naphthalene
NPN

Formula: C_{16}H_{13}N
Molecular weight: 219.28 g/mol
CAS-No.: 90-30-2
EC-No.: 201-983-0

Hazardous ingredients according to Regulation (EC) No 1272/2008

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<th>Component</th>
<th>Classification</th>
<th>Concentration</th>
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<td></td>
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<tr>
<td>CAS-No.</td>
<td>90-30-2</td>
<td>Acute Tox. 4; Skin Sens. 1; STOT RE 2; Aquatic Acute 1; Aquatic Chronic 1; H302, H317, H373, H410</td>
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<tr>
<td>EC-No.</td>
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<td>&lt;= 100 %</td>
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</table>

Hazardous ingredients according to Directive 1999/45/EC

<table>
<thead>
<tr>
<th>Component</th>
<th>Classification</th>
<th>Concentration</th>
</tr>
</thead>
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<td>N-1-Naphthylanilne</td>
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<tr>
<td>CAS-No.</td>
<td>90-30-2</td>
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<tr>
<td>EC-No.</td>
<td>201-983-0</td>
<td>&lt;= 100 %</td>
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</tbody>
</table>

For the full text of the H-Statements and R-Phrases mentioned in this Section, see Section 16

SECTION 4: First aid measures

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Flush eyes with water as a precaution.
If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

SECTION 5: Firefighting measures

5.1 Extinguishing media
Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
Carbon oxides, Nitrogen oxides (NOx)

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
No data available

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
Use personal protective equipment. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust. For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up
Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid formation of dust and aerosols. Provide appropriate exhaust ventilation at places where dust is formed. For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Store in cool place. Keep container tightly closed in a dry and well-ventilated place. Storage class (TRGS 510): Non Combustible Solids

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated
SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Components with workplace control parameters

8.2 Exposure controls

Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove’s outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

The selected protective gloves have to satisfy the specifications of EU Directive 89/686/EEC and the standard EN 374 derived from it.

Body Protection
Complete suit protecting against chemicals. The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
For nuisance exposures use type P95 (US) or type P1 (EU EN 143) particle respirator. For higher level protection use type OV/AG/P99 (US) or type ABEK-P2 (EU EN 143) respirator cartridges. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td>a)</td>
<td>Appearance</td>
</tr>
<tr>
<td>b)</td>
<td>Odour</td>
</tr>
<tr>
<td>c)</td>
<td>Odour Threshold</td>
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<td>d)</td>
<td>pH</td>
</tr>
<tr>
<td>e)</td>
<td>Melting point/freezing point</td>
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<tr>
<td>f)</td>
<td>Initial boiling point and boiling range</td>
</tr>
<tr>
<td>g)</td>
<td>Flash point</td>
</tr>
<tr>
<td>h)</td>
<td>Evaporation rate</td>
</tr>
<tr>
<td>i)</td>
<td>Flammability (solid, gas)</td>
</tr>
<tr>
<td>j)</td>
<td>Upper/lower flammability or explosive limits</td>
</tr>
</tbody>
</table>
SECTION 10: Stability and reactivity

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
No data available

10.5 Incompatible materials
Strong oxidizing agents, Strong acids

10.6 Hazardous decomposition products
Other decomposition products - No data available
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - 1.625 mg/kg
LD50 Dermal - Rabbit - male - > 5.000 mg/kg

Skin corrosion/irritation
Skin - Rabbit
Result: No skin irritation - 24 h

Serious eye damage/eye irritation
Eyes - Rabbit
Result: No eye irritation
(OECD Test Guideline 405)

Respiratory or skin sensitisation
Maximisation Test (GPMT) - Guinea pig
Result: May cause sensitisation by skin contact.
(OECD Test Guideline 406)
**Germ cell mutagenicity**
Hamster
ovary
Result: negative

Mouse - male
Result: negative
Dominant lethal test

**Carcinogenicity**
Carcinogenicity - Mouse - Oral

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

**Reproductive toxicity**
No data available

**Specific target organ toxicity - single exposure**
No data available

**Specific target organ toxicity - repeated exposure**
No data available

**Aspiration hazard**
No data available

**Additional Information**
Repeated dose toxicity - Rat - male and female - Oral - No observed adverse effect level - 80 mg/kg - Lowest observed adverse effect level - 20 mg/kg
RTECS: QM4500000
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated., Nausea, Dizziness, Headache

---

**SECTION 12: Ecological information**

**12.1 Toxicity**
Toxicity to fish: semi-static test LC50 - Onchorhynchus mykiss (rainbow trout) - 0.44 mg/l - 96 h
Toxicity to daphnia and other aquatic invertebrates: static test LC50 - Daphnia magna (Water flea) - 0.3 mg/l - 48 h
Toxicity to bacteria: Respiration inhibition EC50 - Sludge Treatment - > 10.000 mg/l - 3 h (OECD Test Guideline 209)

**12.2 Persistence and degradability**
Biodegradability: aerobic - Exposure time 28 d
Result: 0 % - Not readily biodegradable. (OECD Test Guideline 301C)

**12.3 Bioaccumulative potential**
Bioaccumulation: Cyprinus carpio (Carp) - 56 d

Bioconcentration factor (BCF): 427 - 2.730 (OECD Test Guideline 305C)
12.4 **Mobility in soil**  
No data available

12.5 **Results of PBT and vPvB assessment**  
This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

12.6 **Other adverse effects**  
Very toxic to aquatic life with long lasting effects.

---

**SECTION 13: Disposal considerations**

13.1 **Waste treatment methods**

**Product**  
Offer surplus and non-recyclable solutions to a licensed disposal company. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

**Contaminated packaging**  
Dispose of as unused product.

---

**SECTION 14: Transport information**

14.1 **UN number**

<table>
<thead>
<tr>
<th></th>
<th>ADR/RID: 3077</th>
<th>IMDG: 3077</th>
<th>IATA: 3077</th>
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</table>

14.2 **UN proper shipping name**

<table>
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<tr>
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<th>ADR/RID: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (N-1-Naphthylaniline)</th>
<th>IMDG: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (N-1-Naphthylaniline)</th>
<th>IATA: Environmentally hazardous substance, solid, n.o.s. (N-1-Naphthylaniline)</th>
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14.3 **Transport hazard class(es)**

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<th>ADR/RID: 9</th>
<th>IMDG: 9</th>
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14.4 **Packaging group**

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<th>ADR/RID: III</th>
<th>IMDG: III</th>
<th>IATA: III</th>
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</table>

14.5 **Environmental hazards**

<table>
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<tr>
<th></th>
<th>ADR/RID: yes</th>
<th>IMDG Marine pollutant: yes</th>
<th>IATA: yes</th>
</tr>
</thead>
</table>

14.6 **Special precautions for user**

**Further information**  
EHS-Mark required (ADR 2.2.9.1.10, IMDG code 2.10.3) for single packagings and combination packagings containing inner packagings with Dangerous Goods > 5L for liquids or > 5kg for solids.

---

**SECTION 15: Regulatory information**

This safety datasheet complies with the requirements of Regulation (EC) No. 1907/2006.

15.1 **Safety, health and environmental regulations/legislation specific for the substance or mixture**

No data available

15.2 **Chemical Safety Assessment**

For this product a chemical safety assessment was not carried out

---

**SECTION 16: Other information**

**Full text of H-statements referred to under sections 2 and 3.**

- Acute Tox.  
  Acute toxicity
- Aquatic Acute  
  Acute aquatic toxicity
- Aquatic Chronic  
  Chronic aquatic toxicity
H302    Harmful if swallowed.
H317    May cause an allergic skin reaction.
H373    May cause damage to organs through prolonged or repeated exposure.
H400    Very toxic to aquatic life.
H410    Very toxic to aquatic life with long lasting effects.
Skin Sens. Skin sensitisation

**Full text of R-phrases referred to under sections 2 and 3**

Xn  Harmful
R22  Harmful if swallowed.
R43  May cause sensitisation by skin contact.
R50/53 Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

**Further information**

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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.
SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers
   Product name : N-Phenyl-2-naphthylamine

   Product Number : 178055
   Brand : Aldrich
   Index-No. : 612-135-00-8
   REACH No. : A registration number is not available for this substance as the substance or its uses are exempted from registration, the annual tonnage does not require a registration or the registration is envisaged for a later registration deadline.
   CAS-No. : 135-88-6

1.2 Relevant identified uses of the substance or mixture and uses advised against
   Identified uses : Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet
   Company : Sigma-Aldrich Chemie GmbH
               Riedstrasse 2
               D-89555 STEINHEIM
   Telephone : +49 89-6513-1444
   Fax : +49 7329-97-2319
   E-mail address : eurtecheserv@sial.com

1.4 Emergency telephone number
   Emergency Phone # : 0800 181 7059 (CHEMTREC Deutschland)
                       +49 (0)696 43508409 (CHEMTREC weltweit)

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture
   Classification according to Regulation (EC) No 1272/2008
   Carcinogenicity (Category 2), H351
   Eye irritation (Category 2), H319
   Skin irritation (Category 2), H315
   Skin sensitisation (Category 1), H317
   Chronic aquatic toxicity (Category 2), H411

   For the full text of the H-Statements mentioned in this Section, see Section 16.

   Classification according to EU Directives 67/548/EEC or 1999/45/EC
   R40
   N Dangerous for the environment
       R51/53
   Xi Irritant
       R43
       R36/38

   For the full text of the R-phrases mentioned in this Section, see Section 16.

2.2 Label elements
   Labelling according Regulation (EC) No 1272/2008
2.3 Other hazards - none

SECTION 3: Composition/information on ingredients

3.1 Substances
Synonyms: N-(2-Naphthyl)aniline

Formula: C_{16}H_{13}N
Molecular Weight: 219.28 g/mol
CAS-No.: 135-88-6
EC-No.: 205-223-9
Index-No.: 612-135-00-8

Hazardous ingredients according to Regulation (EC) No 1272/2008

<table>
<thead>
<tr>
<th>Component</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>N-Phenyl-2-naphthylamine</td>
<td>Skin Irrit. 2; Eye Irrit. 2; Skin Sens. 1; Carc. 2; Aquatic Chronic 2; H319, H315, H317, H351, H411</td>
</tr>
</tbody>
</table>

Hazardous ingredients according to Directive 1999/45/EC

<table>
<thead>
<tr>
<th>Component</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>N-Phenyl-2-naphthylamine</td>
<td>Xn, N, Carc. Cat. 3, R36/38 - R40 - R43 - R51/53</td>
</tr>
</tbody>
</table>

For the full text of the H-Statements and R-Phrases mentioned in this Section, see Section 16

SECTION 4: First aid measures

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.
If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
no data available

SECTION 5: Firefighting measures

5.1 Extinguishing media
Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
Carbon oxides, nitrogen oxides (NOx)

5.3 Advice for firefighters
Wear self contained breathing apparatus for fire fighting if necessary.

5.4 Further information
no data available

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
Use personal protective equipment. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust. For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up
Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid formation of dust and aerosols. Provide appropriate exhaust ventilation at places where dust is formed. For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Store in cool place. Keep container tightly closed in a dry and well-ventilated place.

7.3 Specific end use(s)
A part from the uses mentioned in section 1.2 no other specific uses are stipulated

SECTION 8: Exposure controls/personal protection

8.1 Control parameters
Components with workplace control parameters

8.2 Exposure controls
Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.
Personal protective equipment

Eye/face protection
Face shield and safety glasses. Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166 (EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove’s outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

The selected protective gloves have to satisfy the specifications of EU Directive 89/686/EEC and the standard EN 374 derived from it.

Body Protection
Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

| a) | Appearance | Form: flakes |
|    |            | Colour: grey |
| b) | Odour      | no data available |
| c) | Odour Threshold | no data available |
| d) | pH         | no data available |
| e) | Melting point/freezing point | Melting point/range: 105 - 108 °C - lit. |
| f) | Initial boiling point and boiling range | 395 - 395,5 °C - lit. |
| g) | Flash point | no data available |
| h) | Evaporation rate | no data available |
| i) | Flammability (solid, gas) | no data available |
| j) | Upper/lower flammability or explosive limits | no data available |
| k) | Vapour pressure | no data available |
| l) | Vapour density | no data available |
| m) | Relative density | no data available |
| n) | Water solubility | no data available |
| o) | Partition coefficient: n-octanol/water | log Pow: 5 |
| p) | Auto-ignition temperature | no data available |
9.2 Other safety information
no data available

SECTION 10: Stability and reactivity

10.1 Reactivity
no data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
no data available

10.4 Conditions to avoid
no data available

10.5 Incompatible materials
Oxidizing agentsStrong oxidizing agents

10.6 Hazardous decomposition products
Other decomposition products - no data available
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - rat - 8.730 mg/kg

Skin corrosion/irritation
no data available

Serious eye damage/eye irritation
no data available

Respiratory or skin sensitisation
no data available

Germ cell mutagenicity
no data available

Carcinogenicity
This product is or contains a component that is not classifiable as to its carcinogenicity based on its IARC, ACGIH, NTP, or EPA classification.

Limited evidence of carcinogenicity in animal studies

IARC: 3 - Group 3: Not classifiable as to its carcinogenicity to humans (N-Phenyl-2-naphthyamine)

Reproductive toxicity
no data available

Specific target organ toxicity - single exposure
no data available

Specific target organ toxicity - repeated exposure
no data available
Aspiration hazard
do not data available

Additional Information
RTECS: QM4550000
Absorption into the body leads to the formation of methemoglobin which in sufficient concentration causes cyanosis. Onset may be delayed 2 to 4 hours or longer.

SECTION 12: Ecological information

12.1 Toxicity
do not data available

12.2 Persistence and degradability

12.3 Bioaccumulative potential
Bioaccumulation Pimephales promelas (fathead minnow) - 32 d
- 52.1 μg/l
Bioconcentration factor (BCF): 147

12.4 Mobility in soil
do not data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not required/not conducted

12.6 Other adverse effects
Toxic to aquatic life.

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product
Offer surplus and non-recyclable solutions to a licensed disposal company. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Contaminated packaging
Dispose of as unused product.

SECTION 14: Transport information

14.1 UN number
ADR/RID: 3077 IMDG: 3077 IATA: 3077

14.2 UN proper shipping name
ADR/RID: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (N-Phenyl-2-naphthylamine)
IMDG: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (N-Phenyl-2-naphthylamine)
IATA: Environmentally hazardous substance, solid, n.o.s. (N-Phenyl-2-naphthylamine)

14.3 Transport hazard class(es)
ADR/RID: 9 IMDG: 9 IATA: 9

14.4 Packaging group
ADR/RID: III IMDG: III IATA: III

14.5 Environmental hazards
ADR/RID: yes IMDG Marine pollutant: yes IATA: yes

14.6 Special precautions for user

Further information
EHS-Mark required (ADR 2.2.9.1.10, IMDG code 2.10.3) for single packagings and combination packagings containing inner packagings with Dangerous Goods > 5L for liquids or > 5kg for solids.
SECTION 15: Regulatory information

This safety datasheet complies with the requirements of Regulation (EC) No. 1907/2006.

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture

no data available

15.2 Chemical Safety Assessment

For this product a chemical safety assessment was not carried out

SECTION 16: Other information

Full text of H-Statements referred to under sections 2 and 3.

Aquatic Chronic  Chronic aquatic toxicity
Carc.  Carcinogenicity
Eye Irrit.  Eye irritation
H315  Causes skin irritation.
H317  May cause an allergic skin reaction.
H319  Causes serious eye irritation.
H351  Suspected of causing cancer.
H411  Toxic to aquatic life with long lasting effects.
Skin Irrit.  Skin irritation
Skin Sens.  Skin sensitisation

Full text of R-phrases referred to under sections 2 and 3

N  Dangerous for the environment
Xn  Harmful
R36/38  Irritating to eyes and skin.
R40  Limited evidence of a carcinogenic effect.
R43  May cause sensitisation by skin contact.
R51/53  Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

Further information

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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.
SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers
   Product name : Sodium nitrite

   Product Number : 237213
   Brand : Sigma-Aldrich
   Index-No. : 007-010-00-4
   REACH No. : A registration number is not available for this substance as the substance or its uses are exempted from registration, the annual tonnage does not require a registration or the registration is envisaged for a later registration deadline.

   CAS-No. : 7632-00-0

1.2 Relevant identified uses of the substance or mixture and uses advised against
   Identified uses : Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet
   Company : Sigma-Aldrich
              3050 Spruce Street
              SAINT LOUIS MO 63103
              USA

   Telephone : +1 800-325-5832
   Fax : +1 800-325-5052

1.4 Emergency telephone number
   Emergency Phone # : +1-703-527-3887 (CHEMTREC)

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

   Classification according to Regulation (EC) No 1272/2008
   Oxidizing solids (Category 3), H272
   Acute toxicity, Oral (Category 3), H301
   Eye irritation (Category 2), H319
   Acute aquatic toxicity (Category 1), H400

   For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 Label elements

   Labelling according Regulation (EC) No 1272/2008
   Pictogram

   Signal word : Danger
   Hazard statement(s)
      H272 : May intensify fire; oxidizer.
H301  Toxic if swallowed.
H319  Causes serious eye irritation.
H400  Very toxic to aquatic life.

Precautionary statement(s)
P220  Keep/Store away from clothing/ combustible materials.
P273  Avoid release to the environment.
P301 + P310 IF SWALLOWED: Immediately call a POISON CENTER/doctor.
P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

Supplemental Hazard Statements
none

2.3 Other hazards
This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

SECTION 3: Composition/information on ingredients

3.1 Substances
Formula : NNaO₂
Molecular weight : 69.00 g/mol
CAS-No. : 7632-00-0
EC-No. : 231-555-9
Index-No. : 007-010-00-4

Hazardous ingredients according to Regulation (EC) No 1272/2008

<table>
<thead>
<tr>
<th>Component</th>
<th>Classification</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sodium nitrite</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CAS-No.</td>
<td>7632-00-0</td>
<td>Ox. Sol. 3; Acute Tox. 3; Eye Irrit. 2; Aquatic Acute 1; H272, H301, H319, H400</td>
</tr>
<tr>
<td>EC-No.</td>
<td>231-555-9</td>
<td>M-Factor - Aquatic Acute: 1</td>
</tr>
<tr>
<td>Index-No.</td>
<td>007-010-00-4</td>
<td>&lt;= 100 %</td>
</tr>
</tbody>
</table>

For the full text of the H-Statements mentioned in this Section, see Section 16.

SECTION 4: First aid measures

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Take victim immediately to hospital. Consult a physician.

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11
4.3 Indication of any immediate medical attention and special treatment needed
No data available

SECTION 5: Firefighting measures
5.1 Extinguishing media
   Suitable extinguishing media
   Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.
5.2 Special hazards arising from the substance or mixture
   No data available
5.3 Advice for firefighters
   Wear self-contained breathing apparatus for firefighting if necessary.
5.4 Further information
   Use water spray to cool unopened containers.

SECTION 6: Accidental release measures
6.1 Personal precautions, protective equipment and emergency procedures
   Wear respiratory protection. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust. For personal protection see section 8.
6.2 Environmental precautions
   Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.
6.3 Methods and materials for containment and cleaning up
   Sweep up and shovel. Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations (see section 13). Keep in suitable, closed containers for disposal.
6.4 Reference to other sections
   For disposal see section 13.

SECTION 7: Handling and storage
7.1 Precautions for safe handling
   Avoid contact with skin and eyes. Avoid formation of dust and aerosols. Provide appropriate exhaust ventilation at places where dust is formed. Keep away from sources of ignition - No smoking. Keep away from heat and sources of ignition. For precautions see section 2.2.
7.2 Conditions for safe storage, including any incompatibilities
   Store in cool place. Keep container tightly closed in a dry and well-ventilated place. hygroscopic
7.3 Specific end use(s)
   Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

SECTION 8: Exposure controls/personal protection
8.1 Control parameters
   Components with workplace control parameters
8.2 Exposure controls
   Appropriate engineering controls
   Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product.
Personal protective equipment

Eye/face protection
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove’s outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

The selected protective gloves have to satisfy the specifications of EU Directive 89/686/EEC and the standard EN 374 derived from it.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0,11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0,11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de,
test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

<table>
<thead>
<tr>
<th>a) Appearance</th>
<th>Form: solid</th>
</tr>
</thead>
<tbody>
<tr>
<td>b) Odour</td>
<td>odourless</td>
</tr>
<tr>
<td>c) Odour Threshold</td>
<td>No data available</td>
</tr>
<tr>
<td>d) pH</td>
<td>9</td>
</tr>
<tr>
<td>e) Melting point/freezing point</td>
<td>Melting point/range: 271 °C - lit.</td>
</tr>
<tr>
<td>f) Initial boiling point and boiling range</td>
<td>320 °C</td>
</tr>
</tbody>
</table>
### SECTION 10: Stability and reactivity

#### 10.1 Reactivity
No data available

#### 10.2 Chemical stability
Stable under recommended storage conditions.

#### 10.3 Possibility of hazardous reactions
No data available

#### 10.4 Conditions to avoid
Exposure to moisture

#### 10.5 Incompatible materials
Acids, Powdered metals, Ammonia, Cyanides, Amines, Activated carbon, Combustible material, Reducing agents

#### 10.6 Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Nitrogen oxides (NOx), Sodium oxides
Other decomposition products - No data available
In the event of fire: see section 5

---

### SECTION 11: Toxicological information

#### 11.1 Information on toxicological effects

**Acute toxicity**

- LD50 Oral - Rat: 157.9 mg/kg
- LD50 Oral - Mouse: 175 mg/kg

Remarks: Vascular: BP lowering not characterized in autonomic section. Vascular: Regional or general arteriolar or venous dilation.
**Skin corrosion/irritation**  
Skin - Rabbit  
Result: No skin irritation - 48 h  
(OECD Test Guideline 404)

**Serious eye damage/eye irritation**  
Eyes - Rabbit  
Result: Eye irritation - 24 h  
(OECD Test Guideline 405)

**Respiratory or skin sensitisation**  
No data available

**Germ cell mutagenicity**  
No data available

**Carcinogenicity**

IARC: 2A - Group 2A: Probably carcinogenic to humans (Sodium nitrite)

**Reproductive toxicity**  
No data available

**Specific target organ toxicity - single exposure**  
No data available

**Specific target organ toxicity - repeated exposure**  
No data available

**Aspiration hazard**  
No data available

**Additional Information**

RTECS: RA12250000

Headache, Nausea, Incoordination, Absorption into the body leads to the formation of methemoglobin which in sufficient concentration causes cyanosis. Onset may be delayed 2 to 4 hours or longer. To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Liver - Irregularities - Based on Human Evidence

---

**SECTION 12: Ecological information**

**12.1 Toxicity**

Toxicity to fish: flow-through test LC50 - Oncorhynchus mykiss (rainbow trout) - 0,94 - 1,92 mg/l - 96,0 h

mortality NOEC - Oncorhynchus mykiss (rainbow trout) - 0,54 mg/l - 96,0 h

Toxicity to daphnia and other aquatic invertebrates: EC50 - Daphnia magna (Water flea) - 12,5 mg/l - 48 h

Toxicity to algae: NOEC - Desmodesmus subspicatus (green algae) - 100 mg/l - 72 h  
(OECD Test Guideline 201)

**12.2 Persistence and degradability**

The methods for determining biodegradability are not applicable to inorganic substances.

**12.3 Bioaccumulative potential**

No data available

**12.4 Mobility in soil**

No data available

**12.5 Results of PBT and vPvB assessment**
This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

12.6 Other adverse effects
Very toxic to aquatic life.

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product
Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Offer surplus and non-recyclable solutions to a licensed disposal company.

Contaminated packaging
Dispose of as unused product.

SECTION 14: Transport information

14.1 UN number
ADR/RID: 1500
IMDG: 1500
IATA: 1500

14.2 UN proper shipping name
ADR/RID: SODIUM NITRITE
IMDG: SODIUM NITRITE
IATA: Sodium nitrite

14.3 Transport hazard class(es)
ADR/RID: 5.1 (6.1)
IMDG: 5.1 (6.1)
IATA: 5.1 (6.1)

14.4 Packaging group
ADR/RID: III
IMDG: III
IATA: III

14.5 Environmental hazards
ADR/RID: yes
IMDG Marine pollutant: yes
IATA: no

14.6 Special precautions for user
No data available

SECTION 15: Regulatory information

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture
This safety datasheet complies with the requirements of Regulation (EC) No. 1907/2006.

15.2 Chemical safety assessment
For this product a chemical safety assessment was not carried out

SECTION 16: Other information

Full text of H-Statements referred to under sections 2 and 3.
H272 May intensify fire; oxidizer.
H301 Toxic if swallowed.
H319 Causes serious eye irritation.
H400 Very toxic to aquatic life.

Further information
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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held
liable for any damage resulting from handling or from contact with the above product. See www.sigma-
aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.
1. IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING

1.1 Product identifiers

Product name: N-Nitrosodiphenylamine

Product Number: 73900
Brand: Aldrich
CAS-No.: 86-30-6

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses: Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet

Company: Sigma-Aldrich Chemie GmbH
Riedstrasse 2
D-89555 STEINHEIM

Telephone: +49 89-6513-1444
Fax: +49 7329-97-2319
E-mail address: eurtechserv@siad.com

1.4 Emergency telephone number

Emergency Phone #:
0800 181 7059 (CHEMTREC Deutschland)
+49 (0)696 43508409 (CHEMTREC weltweit)

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

Classification according to Regulation (EC) No 1272/2008 [EU-GHS/CLP]
Acute toxicity, Oral (Category 4)
Eye irritation (Category 2)

Classification according to EU Directives 67/548/EEC or 1999/45/EC
Harmful if swallowed.

2.2 Label elements

Labelling according Regulation (EC) No 1272/2008 [CLP]

Pictogram: ⚠️

Signal word: Warning
Hazard statement(s):
H302 Harmful if swallowed.
H319 Causes serious eye irritation.

Precautionary statement(s):
P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

Supplemental Hazard Statements: none

R-phrase(s)
R22 Harmful if swallowed.

S-phrase(s) none

2.3 Other hazards - none

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances
Synonyms: DiphenylNitrosamine
DiphenylNitrosoamine
N-Nitroso-N-phenylaniline

Formula: C_{12}H_{10}N_{2}O
Molecular Weight: 198.22 g/mol

<table>
<thead>
<tr>
<th>Component</th>
<th>Concentration</th>
</tr>
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<tr>
<td>N-Nitrosodiphenylamine</td>
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<td>CAS-No.</td>
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<tr>
<td>EC-No.</td>
<td>201-663-0</td>
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</tbody>
</table>

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

4.3 Indication of any immediate medical attention and special treatment needed
no data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
Carbon oxides, nitrogen oxides (NOx)

5.3 Advice for firefighters
Wear self contained breathing apparatus for fire fighting if necessary.

5.4 Further information
no data available
6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures
Use personal protective equipment. Avoid dust formation. Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Avoid breathing dust.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up
Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid formation of dust and aerosols. Provide appropriate exhaust ventilation at places where dust is formed. Normal measures for preventive fire protection.

7.2 Conditions for safe storage, including any incompatibilities
Store in cool place. Keep container tightly closed in a dry and well-ventilated place.
Store under inert gas. Air sensitive.

7.3 Specific end uses
no data available

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters

8.2 Exposure controls

Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection
Safety glasses with side-shields conforming to EN166 Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove’s outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

The selected protective gloves have to satisfy the specifications of EU Directive 89/686/EEC and the standard EN 374 derived from it.

Body Protection
Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
For nuisance exposures use type P95 (US) or type P1 (EU EN 143) particle respirator. For higher level protection use type OV/AG/P99 (US) or type ABEK-P2 (EU EN 143) respirator cartridges. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).
9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a) Appearance Form: solid
b) Odour no data available
c) Odour Threshold no data available
d) pH no data available
e) Melting point/freezing point Melting point/range: 65 - 66 °C
f) Initial boiling point and boiling range no data available
g) Flash point no data available
h) Evaporation rate no data available
i) Flammability (solid, gas) no data available
j) Upper/lower flammability or explosive limits no data available
k) Vapour pressure no data available
l) Vapour density no data available
m) Relative density no data available
n) Water solubility no data available
o) Partition coefficient: n-octanol/water log Pow: 3.13
p) Autoignition temperature no data available
q) Decomposition temperature no data available
r) Viscosity no data available
s) Explosive properties no data available
t) Oxidizing properties no data available

9.2 Other safety information

- Solubility in other solvents Methanol 100 g/l - soluble

10. STABILITY AND REACTIVITY

10.1 Reactivity
no data available

10.2 Chemical stability
no data available

10.3 Possibility of hazardous reactions
no data available

10.4 Conditions to avoid
no data available

10.5 Incompatible materials
Strong oxidizing agents

10.6 Hazardous decomposition products
Other decomposition products - no data available
11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

**Acute toxicity**
LD50 Oral - rat - 1.825 mg/kg
Remarks: Cyanosis
LD50 Dermal - rabbit - > 7.940 mg/kg

**Skin corrosion/irritation**

**Serious eye damage/eye irritation**
Eyes - rabbit - Mild eye irritation - 24 h

**Respiratory or skin sensitization**
no data available

**Germ cell mutagenicity**
Laboratory experiments have shown mutagenic effects.

**Carcinogenicity**
Carcinogenicity - rat - Oral

Carcinogenicity - mouse - Skin

Carcinogenicity - rat - Oral

Carcinogenicity - rat - Intraperitoneal
Tumorigenic:Equivocal tumorigenic agent by RTECS criteria. Liver:Tumors. Endocrine:Tumors.

Carcinogenicity - mouse - Oral

This product is or contains a component that is not classifiable as to its carcinogenicity based on its IARC, ACGIH, NTP, or EPA classification. Nitrosamines are suspected of causing cancers of the lung, nasal sinuses, brain, esophagus, stomach, liver, bladder, and kidney.

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

**Reproductive toxicity**
no data available

**Specific target organ toxicity - single exposure**
no data available

**Specific target organ toxicity - repeated exposure**
no data available

**Aspiration hazard**
no data available

**Potential health effects**

- **Inhalation**: May be harmful if inhaled. May cause respiratory tract irritation.
- **Ingestion**: Harmful if swallowed.
- **Skin**: May be harmful if absorbed through skin. May cause skin irritation.
- **Eyes**: Causes eye irritation.
Signs and Symptoms of Exposure
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Additional Information
RTECS: JJ9800000

12. ECOLOGICAL INFORMATION

12.1 Toxicity
Toxicity to fish
LC50 - Lepomis macrochirus (Bluegill) - 5.8 mg/l - 96 h
Toxicity to daphnia and other aquatic invertebrates
LC50 - Daphnia magna (Water flea) - 7.8 mg/l - 48 h

12.2 Persistence and degradability

12.3 Bioaccumulative potential
Bioaccumulation
Lepomis macrochirus (Bluegill) - 14 d -0.00921 mg/l
Bioconcentration factor (BCF): 217

12.4 Mobility in soil
no data available

12.5 Results of PBT and vPvB assessment
no data available

12.6 Other adverse effects
Toxic to aquatic life.
no data available

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods
Product
Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

14.1 UN number
ADR/RID: -
IMDG: -
IATA: -

14.2 UN proper shipping name
ADR/RID: Not dangerous goods
IMDG: Not dangerous goods
IATA: Not dangerous goods

14.3 Transport hazard class(es)
ADR/RID: -
IMDG: -
IATA: -

14.4 Packaging group
ADR/RID: -
IMDG: -
IATA: -

14.5 Environmental hazards
ADR/RID: no
IMDG Marine pollutant: no
IATA: no

14.6 Special precautions for user
no data available
15. REGULATORY INFORMATION
This safety datasheet complies with the requirements of Regulation (EC) No. 1907/2006.

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture
no data available

15.2 Chemical Safety Assessment
no data available

16. OTHER INFORMATION
Further information
Copyright 2012 Sigma-Aldrich Co. LLC. License granted to make unlimited paper copies for internal use only.
The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.
SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers
   Product name: Hexamethylenetetramine
   Product Number: 398160
   Brand: Sigma-Aldrich
   Index-No.: 612-101-00-2
   REACH No.: A registration number is not available for this substance as the substance or its uses are exempted from registration, the annual tonnage does not require a registration or the registration is envisaged for a later registration deadline.
   CAS-No.: 100-97-0

1.2 Relevant identified uses of the substance or mixture and uses advised against
   Identified uses: Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet
   Company: Sigma-Aldrich Chemie GmbH
   Riedstrasse 2
   D-89555 STEINHEIM
   Telephone: +49 89-6513-1444
   Fax: +49 7329-97-2319
   E-mail address: eurtechserv@sial.com

1.4 Emergency telephone number
   Emergency Phone # 0800 181 7059 (CHEMTREC Deutschland)
   +49 (0)696 43508409 (CHEMTREC weltweit)

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture
   Classification according to Regulation (EC) No 1272/2008
   Flammable solids (Category 2), H228
   Skin sensitisation (Category 1), H317
   For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 Label elements
   Labelling according Regulation (EC) No 1272/2008
   Pictogram

   Signal word: Warning
   Hazard statement(s)
   H228: Flammable solid.
   H317: May cause an allergic skin reaction.
Precautionary statement(s)
P210 Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
P280 Wear protective gloves/ protective clothing/ eye protection/ face protection.
P333 + P313 If skin irritation or rash occurs: Get medical advice/ attention.
Supplemental Hazard Statements none

2.3 Other hazards
This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

SECTION 3: Composition/information on ingredients

3.1 Substances
Synonyms : Urotropine
1,3,5,7-Tetrazatricyclo[3.3.1.3.7]decane
Hexamine
Methenamine

Formula : C₆H₁₂N₄
Molecular weight : 140,19 g/mol
CAS-No. : 100-97-0
EC-No. : 202-905-8
Index-No. : 612-101-00-2

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<tr>
<th>Hazardous ingredients according to Regulation (EC) No 1272/2008</th>
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</thead>
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<tr>
<td>Component</td>
</tr>
<tr>
<td>-----------</td>
</tr>
<tr>
<td>Hexamethylenetetramine</td>
</tr>
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<td></td>
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<td></td>
</tr>
</tbody>
</table>

For the full text of the H-Statements mentioned in this Section, see Section 16.

SECTION 4: First aid measures

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11.
4.3 Indication of any immediate medical attention and special treatment needed
No data available

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
Carbon oxides, Nitrogen oxides (NOx), Hydrogen cyanide (hydrocyanic acid)

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
Use water spray to cool unopened containers.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
Use personal protective equipment. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Avoid breathing dust.
For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

6.3 Methods and materials for containment and cleaning up
Sweep up and shovel. Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations (see section 13). Keep in suitable, closed containers for disposal. Contain spillage, pick up with an electrically protected vacuum cleaner or by wet-brushing and transfer to a container for disposal according to local regulations (see section 13).

6.4 Reference to other sections
For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid formation of dust and aerosols. Provide appropriate exhaust ventilation at places where dust is formed. Keep away from sources of ignition - No smoking. Take measures to prevent the build up of electrostatic charge.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Store in cool place. Keep container tightly closed in a dry and well-ventilated place.

Hygroscopic
Storage class (TRGS 510): Flammable solid hazardous materials

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated
SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Components with workplace control parameters

8.2 Exposure controls

Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

**Eye/face protection**
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

**Skin protection**
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove’s outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

The selected protective gloves have to satisfy the specifications of EU Directive 89/686/EEC and the standard EN 374 derived from it.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0,11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0,11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

**Body Protection**
Complete suit protecting against chemicals, Flame retardant antistatic protective clothing,. The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

**Respiratory protection**
Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

**Control of environmental exposure**
Prevent further leakage or spillage if safe to do so. Do not let product enter drains.
SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a) Appearance
   Form: crystalline
   Colour: colourless

b) Odour
   ammoniacal

c) Odour Threshold
   No data available

d) pH
   No data available

e) Melting point/freezing point
   280 °C

f) Initial boiling point and boiling range
   No data available

g) Flash point
   250 °C - closed cup

h) Evaporation rate
   No data available

i) Flammability (solid, gas)
   The substance or mixture is a flammable solid with the category 2.

j) Upper/lower flammability or explosive limits
   No data available

k) Vapour pressure
   < 0,01 hPa at 20 °C

l) Vapour density
   No data available

m) Relative density
   1,331 g/cm3

n) Water solubility
   soluble

o) Partition coefficient: n-octanol/water
   log Pow: -2,179 at 20 °C

p) Auto-ignition temperature
   No data available

q) Decomposition temperature
   No data available

r) Viscosity
   No data available

s) Explosive properties
   No data available

t) Oxidizing properties
   No data available

9.2 Other safety information

   Surface tension
   70,4 mN/m at 20 °C

SECTION 10: Stability and reactivity

10.1 Reactivity
   No data available

10.2 Chemical stability
   Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
   No data available

10.4 Conditions to avoid
   Exposure to moisture
   Heat, flames and sparks.

10.5 Incompatible materials
   Strong acids, Acids, Strong oxidizing agents
10.6 Hazardous decomposition products
Other decomposition products - No data available
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - > 20.000 mg/kg
LD50 Dermal - Rat - male and female - > 2.000 mg/kg
(OECD Test Guideline 402)

Skin corrosion/irritation
Skin - Rabbit
Result: No skin irritation - 4 h
(OECD Test Guideline 404)

Serious eye damage/eye irritation
Eyes - Rabbit
Result: No eye irritation
(OECD Test Guideline 405)

Respiratory or skin sensitisation
Maximisation Test (GPMT) - Guinea pig
Result: May cause sensitisation by skin contact.
(OECD Test Guideline 406)

Germ cell mutagenicity
Salmonella typhimurium
Result: negative

Mouse - male
Result: negative

Carcinogenicity
IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

Reproductive toxicity
No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

Additional Information
Repeated dose toxicity
Rat - male - Oral - NOAEL : >= 80 mg/kg
Rat - female - Oral - NOAEL : >= 100 mg/kg
RTECS: MN4725000
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.
Liver - Irregularities - Based on Human Evidence
SECTION 12: Ecological information

12.1 Toxicity
Toxicity to fish
- static test LC50 - Cyprinodon variegatus (sheepshead minnow) - 49.000 mg/l - 96 h
  (OECD Test Guideline 203)
Toxicity to daphnia and other aquatic invertebrates
- static test EC50 - Daphnia magna (Water flea) - 36.000 mg/l - 48 h

12.2 Persistence and degradability
Biodegradability
- aerobic - Exposure time 28 d
  Result: 35 % - According to the results of tests of biodegradability this product is not readily biodegradable.
  (OECD Test Guideline 301D)

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

12.6 Other adverse effects
No data available

SECTION 13: Disposal considerations

13.1 Waste treatment methods
Product
- Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Offer surplus and non-recyclable solutions to a licensed disposal company.

Contaminated packaging
- Dispose of as unused product.

SECTION 14: Transport information

14.1 UN number
ADR/RID: 1328
IMDG: 1328
IATA: 1328

14.2 UN proper shipping name
ADR/RID: HEXAMETHYLENETETRAMINE
IMDG: HEXAMETHYLENETETRAMINE
IATA: Hexamethylenetetramine
Special Provisions: “Keep away from heat” label required.

14.3 Transport hazard class(es)
ADR/RID: 4.1
IMDG: 4.1
IATA: 4.1

14.4 Packaging group
ADR/RID: III
IMDG: III
IATA: III

14.5 Environmental hazards
ADR/RID: no
IMDG Marine pollutant: no
IATA: no

14.6 Special precautions for user
No data available
SECTION 15: Regulatory information

This safety datasheet complies with the requirements of Regulation (EC) No. 453/2010.

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture

15.2 Chemical Safety Assessment
For this product a chemical safety assessment was not carried out

SECTION 16: Other information

Full text of H-Statements referred to under sections 2 and 3.

H228 Flammable solid.
H317 May cause an allergic skin reaction.

Further information
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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.
Material Safety Data Sheet
Paraffin MSDS

Section 1: Chemical Product and Company Identification

<table>
<thead>
<tr>
<th>Product Name: Paraffin</th>
<th>Contact Information:</th>
</tr>
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<tbody>
<tr>
<td>Catalog Codes: SLP4450</td>
<td>Sciencelab.com, Inc.</td>
</tr>
<tr>
<td>CAS#: 8002-74-2 or 64742-43-4</td>
<td>14025 Smith Rd.</td>
</tr>
<tr>
<td>RTECS: RV0350000</td>
<td>Houston, Texas 77396</td>
</tr>
<tr>
<td>TSCA: TSCA 8(b) inventory: Wax (Paraffin)</td>
<td>US Sales: 1-800-901-7247</td>
</tr>
<tr>
<td>CI#: Not available.</td>
<td>International Sales: 1-281-441-4400</td>
</tr>
<tr>
<td>Synonym: Paraffin Wax</td>
<td>Order Online: ScienceLab.com</td>
</tr>
<tr>
<td>Chemical Name: Paraffin</td>
<td></td>
</tr>
<tr>
<td>Chemical Formula: Not available.</td>
<td>CHEMTREC (24HR Emergency Telephone), call:</td>
</tr>
<tr>
<td></td>
<td>1-800-424-9300</td>
</tr>
<tr>
<td></td>
<td>International CHEMTREC, call: 1-703-527-3887</td>
</tr>
<tr>
<td></td>
<td>For non-emergency assistance, call: 1-281-441-4400</td>
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Section 2: Composition and Information on Ingredients

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<thead>
<tr>
<th>Composition:</th>
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<tbody>
<tr>
<td>Name</td>
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<td>Wax (Paraffin) Beads</td>
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Toxicological Data on Ingredients: Not applicable.

Section 3: Hazards Identification

Potential Acute Health Effects: Slightly hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion, of inhalation.

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: Not available. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. Repeated or prolonged exposure is not known to aggravate medical condition.

Section 4: First Aid Measures

Eye Contact: Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention if irritation occurs.
Skin Contact: Wash with soap and water. Cover the irritated skin with an emollient. Get medical attention if irritation develops.

Serious Skin Contact: Not available.

Inhalation:
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

Serious Inhalation: Not available.

Ingestion:
Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If large quantities of this material are swallowed, call a physician immediately. Loosen tight clothing such as a collar, tie, belt or waistband.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: May be combustible at high temperature.

Auto-Ignition Temperature: 245°C (473°F) - 340 C


Flammable Limits: Not available.

Products of Combustion: Not available.

Fire Hazards in Presence of Various Substances:
Slightly flammable to flammable in presence of heat. Non-flammable in presence of shocks.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions:
SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use water spray, fog or foam. Do not use water jet.

Special Remarks on Fire Hazards: Not available.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill:
Use appropriate tools to put the spilled solid in a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and dispose of according to local and regional authority requirements.

Large Spill:
Use a shovel to put the material into a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and allow to evacuate through the sanitary system. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:
Keep away from heat. Keep away from sources of ignition. Empty containers pose a fire risk, evaporate the residue under a fume hood. Ground all equipment containing material. Do not breathe dust. Keep away from incompatibles such as oxidizing agents.
**Storage:** Keep container tightly closed. Keep container in a cool, well-ventilated area.

### Section 8: Exposure Controls/Personal Protection

**Engineering Controls:**
Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

**Personal Protection:** Safety glasses. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

**Personal Protection in Case of a Large Spill:**
Splash goggles. Full suit. Dust respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

**Exposure Limits:**
Parrafin Wax (Fume) TWA: 2 STEL: 6 (mg/m³) [Canada] TWA: 2 (mg/m³) from OSHA (PEL) [United States] TWA: 2 (mg/m³) from ACGIH (TLV) [United States] TWA: 2 (mg/m³) from NIOSH [United States] TWA: 2 STEL: 6 [United Kingdom (UK)] Consult local authorities for acceptable exposure limits.

### Section 9: Physical and Chemical Properties

**Physical state and appearance:** Solid.

**Odor:** Odorless.

**Taste:** Not available.

**Molecular Weight:** Not available.

**Color:** White.

**pH (1% soln/water):** Not applicable.

**Boiling Point:** Not available.

**Melting Point:** 47°C (116.6°F) - 65°C

**Critical Temperature:** Not available.

**Specific Gravity:**
0.9 @ 20 deg. C 0.92 @ 25 deg. C (Water = 1)

**Vapor Pressure:** Not applicable.

**Vapor Density:** Not available.

**Volutility:** Not available.

**Odor Threshold:** Not available.

**Water/Oil Dist. Coeff.:** Not available.

**Ionicity (in Water):** Not available.

**Dispersion Properties:** Not available.

**Solubility:** Insoluble in cold water, hot water.

### Section 10: Stability and Reactivity Data
Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Excess heat

Incompatibility with various substances: Reactive with oxidizing agents.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity: Not available.

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Eye contact. Inhalation. Ingestion.

Toxicity to Animals:
LD50: Not available. LC50: Not available.

Chronic Effects on Humans: Not available.

Other Toxic Effects on Humans: Slightly hazardous in case of skin contact (irritant), of ingestion, of inhalation.

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: Not available.

Special Remarks on other Toxic Effects on Humans:
Acute Potential Health Effects: Skin: Solid material is not expected to be an irritant, but it may cause mild skin irritation. Eyes: Solid materials is not expected to be an irritant, but it may cause mild eye irritation. Vapors from molten wax may cause eye irritation. Inhalation: Low hazard. Paraffin wax fumes may be irritating to the eyes nose and throat. and may also produce nausea. *However, vapors emitted from molten wax are expected to have a low degree of irritation by inhalation. Ingestion: Ingested paraffin wax is not absorbed, and is considered nontoxic. Ingestion of large amounts may have a mild laxative effect and cause diarrhea. Chronic Potential Health Effects: Skin: Poor personal hygiene can lead to wax plugging of skin follicles and producing so-called "Wax Boils".

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: Not available.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:
Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14: Transport Information
DOT Classification: Not a DOT controlled material (United States).

Identification: Not applicable.

Special Provisions for Transport: Not applicable.

---

**Section 15: Other Regulatory Information**

Federal and State Regulations:
Illinois toxic substances disclosure to employee act: Wax (Paraffin) Fume Rhode Island RTK hazardous substances: Wax (Paraffin) Fume Pennsylvania RTK: Wax (Paraffin) Fume Minnesota: Wax (Paraffin) Fume Massachusetts RTK: Wax (Paraffin) Fume TSCA 8(b) inventory: Wax (Paraffin)

Other Regulations: EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

Other Classifications:
WHMIS (Canada): Not controlled under WHMIS (Canada).
DSCL (EEC):
This product is not classified according to the EU regulations. Not applicable.

HMIS (U.S.A.):
- Health Hazard: 1
- Fire Hazard: 1
- Reactivity: 0
- Personal Protection: E

National Fire Protection Association (U.S.A.):
- Health: 0
- Flammability: 1
- Reactivity: 0
- Specific hazard:

Protective Equipment:
Gloves. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Safety glasses.

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**Section 16: Other Information**

References: Not available.

Other Special Considerations: Not available.

Created: 10/10/2005 11:11 AM
Last Updated: 05/21/2013 12:00 PM

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SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers

Product name: Formaldehyde solution, 36.5-38%

Product Number: F8775
Brand: Sigma
Index-No.: 605-001-00-5
REACH No.: A registration number is not available for this substance as the substance or its uses are exempted from registration, the annual tonnage does not require a registration or the registration is envisaged for a later registration deadline.

CAS-No.: 50-00-0

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses: Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet

Company: Sigma-Aldrich Chemie GmbH
Riedstrasse 2
D-89555 STEINHEIM

Telephone: +49 89-6513-1444
Fax: +49 7329-97-2319
E-mail address: eurtechserv@sial.com

1.4 Emergency telephone number

Emergency Phone #: 0800 181 7059 (CHEMTREC Deutschland)
+49 (0)696 43508409 (CHEMTREC weltweit)

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

Classification according to Regulation (EC) No 1272/2008

Acute toxicity, Oral (Category 3), H301
Acute toxicity, Inhalation (Category 3), H331
Acute toxicity, Dermal (Category 3), H311
Skin corrosion (Category 1B), H314
Skin sensitisation (Category 1), H317
Germ cell mutagenicity (Category 2), H341
Carcinogenicity (Category 1B), H350
Specific target organ toxicity - single exposure (Category 1), H370
Specific target organ toxicity - single exposure (Category 3), Respiratory system, H335

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 Label elements

Labelling according Regulation (EC) No 1272/2008
2.3 Other hazards
This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

SECTION 3: Composition/information on ingredients

3.2 Mixtures
Synonyms : Formalin

Formula : CH2O

Hazardous ingredients according to Regulation (EC) No 1272/2008

<table>
<thead>
<tr>
<th>Component</th>
<th>Classification</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Formaldehyde</td>
<td>Acute Tox. 3; Skin Corr. 1B; Skin Sens. 1; Muta. 2; Carc. 1B; H301, H331, H311, H314, H317, H341, H350</td>
<td>&gt;= 30 - &lt; 50 %</td>
</tr>
<tr>
<td>CAS-No.</td>
<td>50-00-0</td>
<td></td>
</tr>
<tr>
<td>EC-No.</td>
<td>200-001-8</td>
<td></td>
</tr>
<tr>
<td>Index-No.</td>
<td>605-001-00-5</td>
<td></td>
</tr>
</tbody>
</table>
SECTION 4: First aid measures

4.1 Description of first aid measures

**General advice**
Consult a physician. Show this safety data sheet to the doctor in attendance.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Take off contaminated clothing and shoes immediately. Wash off with soap and plenty of water. Take victim immediately to hospital. Consult a physician.

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If swallowed
Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

SECTION 5: Firefighting measures

5.1 Extinguishing media
**Suitable extinguishing media**
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
Carbon oxides

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
Use water spray to cool unopened containers.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
Wear respiratory protection. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapours accumulating to form explosive concentrations. Vapours can accumulate in low areas.

For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.
6.3 Methods and materials for containment and cleaning up
Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations (see section 13). Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling
Avoid exposure - obtain special instructions before use. Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.
Keep away from sources of ignition - No smoking. Take measures to prevent the build up of electrostatic charge.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Store in cool place. Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.
Storage class (TRGS 510): Non-combustible, acute toxic Cat.3 / toxic hazardous materials or hazardous materials causing chronic effects.

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated.

SECTION 8: Exposure controls/personal protection

8.1 Control parameters
Components with workplace control parameters

8.2 Exposure controls
Appropriate engineering controls
Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product.

Personal protective equipment

Eye/face protection
Tightly fitting safety goggles. Faceshield (8-inch minimum). Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove’s outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.
The selected protective gloves have to satisfy the specifications of EU Directive 89/686/EEC and the standard EN 374 derived from it.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0,4 mm
Break through time: 480 min
Material tested:Camatril® (KCL 730 / Aldrich Z677442, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0,2 mm
Break through time: 60 min
Material tested:Dermatril® P (KCL 743 / Aldrich Z677388, Size M)
data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

**Body Protection**
Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

**Respiratory protection**
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

**Control of environmental exposure**
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

### SECTION 9: Physical and chemical properties

#### 9.1 Information on basic physical and chemical properties

| a) Appearance | Form: liquid  
Colour: clear |
| b) Odour | No data available |
| c) Odour Threshold | No data available |
| d) pH | No data available |
| e) Melting point/freezing point | No data available |
| f) Initial boiling point and boiling range | No data available |
| g) Flash point | 64 °C - closed cup |
| h) Evaporation rate | No data available |
| i) Flammability (solid, gas) | No data available |
| j) Upper/lower flammability or explosive limits | Upper explosion limit: 73 %(V)  
Lower explosion limit: 7 %(V) |
| k) Vapour pressure | 69 hPa at 37 °C |
| l) Vapour density | 1,04 - (Air = 1.0) |
| m) Relative density | 1,016 g/cm3 at 20 °C |
| n) Water solubility | No data available |
| o) Partition coefficient: n-Octanol/water | No data available |
| p) Auto-ignition temperature | No data available |
| q) Decomposition temperature | No data available |
| r) Viscosity | No data available |
| s) Explosive properties | No data available |
t) Oxidizing properties  No data available

9.2 Other safety information

Relative vapour density  1.04 - (Air = 1.0)

SECTION 10: Stability and reactivity

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
Heat, flames and sparks.

10.5 Incompatible materials
No data available

10.6 Hazardous decomposition products
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
Classified according to Regulation (EU) 1272/2008, Annex VI (Table 3.1/3.2)

Skin corrosion/irritation
Skin - Rabbit
Result: Corrosive after 3 minutes to 1 hour of exposure - 20 h
(OECD Test Guideline 404)

Serious eye damage/eye irritation
Eyes - Rabbit
Result: Corrosive - 7 d
(OECD Test Guideline 405)

Respiratory or skin sensitisation
Maximisation Test (GPMT) - Guinea pig
Result: Causes sensitisation.
May cause allergic skin reaction.
(OECD Test Guideline 406)

Germ cell mutagenicity
No data available

Carcinogenicity
IARC: 1 - Group 1: Carcinogenic to humans (Formaldehyde)

Reproductive toxicity
No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available
SECTION 12: Ecological information

12.1 Toxicity
No data available

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

12.6 Other adverse effects
Harmful to aquatic life.

SECTION 13: Disposal considerations

13.1 Waste treatment methods
Product
This combustible material may be burned in a chemical incinerator equipped with an afterburner and scrubber. Offer surplus and non-recyclable solutions to a licensed disposal company.

Contaminated packaging
Dispose of as unused product.

SECTION 14: Transport information

14.1 UN number
ADR/RID: 2209
IMDG: 2209
IATA: 2209

14.2 UN proper shipping name
ADR/RID: FORMALDEHYDE SOLUTION
IMDG: FORMALDEHYDE SOLUTION
IATA: Formaldehyde solution

14.3 Transport hazard class(es)
ADR/RID: 8
IMDG: 8
IATA: 8

14.4 Packaging group
ADR/RID: III
IMDG: III
IATA: III

14.5 Environmental hazards
ADR/RID: no
IMDG Marine pollutant: no
IATA: no

14.6 Special precautions for user
No data available

SECTION 15: Regulatory information

This safety datasheet complies with the requirements of Regulation (EC) No. 453/2010.

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture

15.2 Chemical Safety Assessment
For this product a chemical safety assessment was not carried out
SECTION 16: Other information

Full text of H-Statements referred to under sections 2 and 3.

H225  Highly flammable liquid and vapour.
H301  Toxic if swallowed.
H301 + H311 +  Toxic if swallowed, in contact with skin or if inhaled
H331
H311  Toxic in contact with skin.
H314  Causes severe skin burns and eye damage.
H315  Causes skin irritation.
H317  May cause an allergic skin reaction.
H319  Causes serious eye irritation.
H331  Toxic if inhaled.
H335  May cause respiratory irritation.
H341  Suspected of causing genetic defects.
H350  May cause cancer.
H370  Causes damage to organs.
H371  May cause damage to organs.

Further information
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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.
SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers

Product name : Potassium persulfate

Product Number : 216224
Brand : Sigma-Aldrich
Index-No. : 016-061-00-1
REACH No. : A registration number is not available for this substance as the substance or its uses are exempted from registration, the annual tonnage does not require a registration or the registration is envisaged for a later registration deadline.
CAS-No. : 7727-21-1

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Chemie GmbH
           Riedstrasse 2
           D-89555 STEINHEIM
Telephone : +49 89-6513-1444
Fax : +49 7329-97-2319
E-mail address : eurtechserv@sial.com

1.4 Emergency telephone number

Emergency Phone # : 0800 181 7059 (CHEMTREC Deutschland)
                    +49 (0)696 43508409 (CHEMTREC weltweit)

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

Classification according to Regulation (EC) No 1272/2008
Oxidizing solids (Category 3), H272
Acute toxicity, Oral (Category 4), H302
Skin irritation (Category 2), H315
Eye irritation (Category 2), H319
Respiratory sensitisation (Category 1), H334
Skin sensitisation (Category 1), H317
Specific target organ toxicity - single exposure (Category 3), Respiratory system, H335

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 Label elements

Labelling according Regulation (EC) No 1272/2008
Pictogram
Signal word  Danger

Hazard statement(s)
- H272  May intensify fire; oxidizer.
- H302  Harmful if swallowed.
- H315  Causes skin irritation.
- H317  May cause an allergic skin reaction.
- H319  Causes serious eye irritation.
- H334  May cause allergy or asthma symptoms or breathing difficulties if inhaled.
- H335  May cause respiratory irritation.

Precautionary statement(s)
P220  Keep/Store away from clothing/ combustible materials.
P261  Avoid breathing dust.
P280  Wear protective gloves.
P305 + P351 + P338  IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P342 + P311  If experiencing respiratory symptoms: Call a POISON CENTER/doctor.

Supplemental Hazard Statements
- none

2.3 Other hazards
This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

SECTION 3: Composition/information on ingredients

3.1 Substances
Synonyms  Potassium peroxodisulfate

Formula  \( \text{K}_2\text{S}_2\text{O}_8 \)
Molecular weight  270.32 g/mol
CAS-No.  7727-21-1
EC-No.  231-781-8
Index-No.  016-061-00-1

Hazardous ingredients according to Regulation (EC) No 1272/2008

<table>
<thead>
<tr>
<th>Component</th>
<th>Classification</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dipotassium peroxodisulphate</td>
<td>Ox. Sol. 3; Acute Tox. 4; Skin Irrit. 2; Eye Irrit. 2; Resp. Sens. 1; Skin Sens. 1; STOT SE 3; H272, H302, H315, H319, H334, H317, H335</td>
<td>&lt;= 100 %</td>
</tr>
</tbody>
</table>

For the full text of the H-Statements mentioned in this Section, see Section 16.

SECTION 4: First aid measures

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.
In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

SECTION 5: Firefighting measures

5.1 Extinguishing media
Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
Container explosion may occur under fire conditions.

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
Use water spray to cool unopened containers.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
Use personal protective equipment. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust. For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up
Sweep up and shovel. Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations (see section 13). Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid formation of dust and aerosols. Provide appropriate exhaust ventilation at places where dust is formed. Keep away from sources of ignition - No smoking. Keep away from heat and sources of ignition. For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Store in cool place. Keep container tightly closed in a dry and well-ventilated place.
Moisture sensitive.

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated
SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Components with workplace control parameters

8.2 Exposure controls

Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove’s outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

The selected protective gloves have to satisfy the specifications of EU Directive 89/686/EEC and the standard EN 374 derived from it.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0,11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0,11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de,
test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.
SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

- **Appearance**: Form: powder
  Colour: white
- **Odour**: No data available
- **Odour Threshold**: No data available
- **pH**: 2.5 - 4.5 at 27 g/l at 25 °C
- **Melting point/freezing point**: 100 °C
- **Initial boiling point and boiling range**: No data available
- **Flash point**: No data available
- **Evaporation rate**: No data available
- **Flammability (solid, gas)**: No data available
- **Upper/lower flammability or explosive limits**: No data available
- **Vapour pressure**: No data available
- **Vapour density**: 9.33 - (Air = 1.0)
- **Relative density**: 2,477 g/cm3
- **Water solubility**: 27 g/l at 20 °C - completely soluble
- **Partition coefficient: n-octanol/water**: No data available
- **Auto-ignition temperature**: No data available
- **Decomposition temperature**: 170 °C -
- **Viscosity**: No data available
- **Explosive properties**: No data available
- **Oxidizing properties**: The substance or mixture is classified as oxidizing with the category 3.

9.2 Other safety information

- **Relative vapour density**: 9.33 - (Air = 1.0)

SECTION 10: Stability and reactivity

10.1 Reactivity

No data available

10.2 Chemical stability

Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions

No data available

10.4 Conditions to avoid

Exposure to moisture, Heat

10.5 Incompatible materials

Organic materials, Strong reducing agents, Powdered metals, Strong bases, Alcohols, phosphorous, Anhydrides, Halogens, Acids
10.6 Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Sulphur oxides, Potassium oxides
Other decomposition products - No data available
In the event of fire: see section 5

SECTION 11: Toxicological information
11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - 825 mg/kg
LD50 Dermal - Rabbit - > 10.000 mg/kg

Skin corrosion/irritation
No data available

Serious eye damage/eye irritation
No data available

Respiratory or skin sensitisation
No data available

Germ cell mutagenicity
No data available

Carcinogenicity
IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

Reproductive toxicity
No data available

Specific target organ toxicity - single exposure
May cause respiratory irritation.

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

Additional Information
RTECS: SE0400000
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

SECTION 12: Ecological information
12.1 Toxicity
Toxicity to fish  LC50 - Fish - 76,3 mg/l - 96 h
Toxicity to daphnia and other aquatic invertebrates  EC50 - Daphnia (water flea) - 120 mg/l - 48 h
Toxicity to bacteria  EC50 - Bacteria - 83,7 mg/l - 72 h

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available
12.5 **Results of PBT and vPvB assessment**
This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

12.6 **Other adverse effects**
Harmful to aquatic life.

**SECTION 13: Disposal considerations**

13.1 **Waste treatment methods**

**Product**
Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Offer surplus and non-recyclable solutions to a licensed disposal company.

**Contaminated packaging**
Dispose of as unused product.

**SECTION 14: Transport information**

14.1 **UN number**
ADR/RID: 1492  IMDG: 1492  IATA: 1492

14.2 **UN proper shipping name**
ADR/RID: POTASSIUM PERSULPHATE  IMDG: POTASSIUM PERSULPHATE  IATA: Potassium persulphate

14.3 **Transport hazard class(es)**
ADR/RID: 5.1  IMDG: 5.1  IATA: 5.1

14.4 **Packaging group**
ADR/RID: III  IMDG: III  IATA: III

14.5 **Environmental hazards**
ADR/RID: no  IMDG Marine pollutant: no  IATA: no

14.6 **Special precautions for user**
No data available

**SECTION 15: Regulatory information**

15.1 **Safety, health and environmental regulations/legislation specific for the substance or mixture**
This safety datasheet complies with the requirements of Regulation (EC) No. 1907/2006.

15.2 **Chemical safety assessment**
For this product a chemical safety assessment was not carried out

**SECTION 16: Other information**

Full text of H-Statements referred to under sections 2 and 3.
H272 May intensify fire; oxidizer.
H302 Harmful if swallowed.
H315 Causes skin irritation.
H317 May cause an allergic skin reaction.
H319 Causes serious eye irritation.
H334 May cause allergy or asthma symptoms or breathing difficulties if inhaled.
H335 May cause respiratory irritation.
Further information
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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.
1. IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING

1.1 Product identifiers
Product name: Polyethylene
Product Number: 427799
Brand: Aldrich
CAS-No.: 9002-88-4

1.2 Relevant identified uses of the substance or mixture and uses advised against
Identified uses: Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet
Company: Sigma-Aldrich Chemie GmbH
Riedstrasse 2
D-89555 STEINHEIM
Telephone: +49 89-6513-1444
Fax: +49 7329-97-2319
E-mail address: eurtechserv@sial.com

1.4 Emergency telephone number
Emergency Phone #: 0800 181 7059 (CHEMTREC Deutschland)
+49 (0)696 43508409 (CHEMTREC weltweit)

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture
Not a hazardous substance or mixture according to Regulation (EC) No. 1272/2008.
This substance is not classified as dangerous according to Directive 67/548/EEC.

2.2 Label elements
Caution - substance not yet tested completely.

2.3 Other hazards - none

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances
Formula: C2H4

4. FIRST AID MEASURES

4.1 Description of first aid measures
If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration.

In case of skin contact
Wash off with soap and plenty of water.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water.
4.2 Most important symptoms and effects, both acute and delayed
4.3 Indication of any immediate medical attention and special treatment needed
   no data available

5. **FIREFIGHTING MEASURES**

5.1 Extinguishing media
   Suitable extinguishing media
   Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 **Special hazards arising from the substance or mixture**
   Carbon oxides, Acrolein, formaldehyde-like
   Nature of decomposition products not known.
   Carbon oxides

5.3 **Advice for firefighters**
   Wear self contained breathing apparatus for fire fighting if necessary.

5.4 **Further information**
   no data available

6. **ACCIDENTAL RELEASE MEASURES**

6.1 **Personal precautions, protective equipment and emergency procedures**
   Avoid dust formation. Avoid breathing vapors, mist or gas.

6.2 **Environmental precautions**
   Do not let product enter drains.

6.3 **Methods and materials for containment and cleaning up**
   Sweep up and shovel. Keep in suitable, closed containers for disposal.

6.4 **Reference to other sections**
   For disposal see section 13.

7. **HANDLING AND STORAGE**

7.1 **Precautions for safe handling**
   Provide appropriate exhaust ventilation at places where dust is formed. Normal measures for preventive fire protection.

7.2 **Conditions for safe storage, including any incompatibilities**
   Store in cool place. Keep container tightly closed in a dry and well-ventilated place.

7.3 **Specific end uses**
   no data available

8. **EXPOSURE CONTROLS/PERSOENAL PROTECTION**

8.1 **Control parameters**
   Components with workplace control parameters

8.2 **Exposure controls**
   Appropriate engineering controls
   General industrial hygiene practice.

   Personal protective equipment
   **Eye/face protection**
   Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

   **Skin protection**
   Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove’s outer surface) to avoid skin contact with this product. Dispose of
contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

The selected protective gloves have to satisfy the specifications of EU Directive 89/686/EEC and the standard EN 374 derived from it.

**Body Protection**
Choose body protection in relation to its type, to the concentration and amount of dangerous substances, and to the specific work-place. The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

**Respiratory protection**
Respiratory protection is not required. Where protection from nuisance levels of dusts are desired, use type N95 (US) or type P1 (EN 143) dust masks. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

9. **PHYSICAL AND CHEMICAL PROPERTIES**

9.1 **Information on basic physical and chemical properties**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
</table>
| a | Appearance | Form: powder  
Colour: light grey  |
| b | Odour | no data available  |
| c | Odour Threshold | no data available  |
| d | pH | no data available  |
| e | Melting point/freezing point | Melting point/range: 90 °C  |
| f | Initial boiling point and boiling range | no data available  |
| g | Flash point | no data available  |
| h | Evaporation rate | no data available  |
| i | Flammability (solid, gas) | no data available  |
| j | Upper/lower flammability or explosive limits | no data available  |
| k | Vapour pressure | no data available  |
| l | Vapour density | no data available  |
| m | Relative density | 0.906 g/mL at 25 °C  |
| n | Water solubility | no data available  |
| o | Partition coefficient: n-octanol/water | no data available  |
| p | Autoignition temperature | no data available  |
| q | Decomposition temperature | no data available  |
| r | Viscosity | no data available  |
| s | Explosive properties | no data available  |
| t | Oxidizing properties | no data available  |

9.2 **Other safety information**
no data available
10. STABILITY AND REACTIVITY

10.1 Reactivity
no data available

10.2 Chemical stability
no data available

10.3 Possibility of hazardous reactions
no data available

10.4 Conditions to avoid
no data available

10.5 Incompatible materials
Strong oxidizing agents

10.6 Hazardous decomposition products
Other decomposition products - no data available

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
no data available

Skin corrosion/irritation
no data available

Serious eye damage/eye irritation
no data available

Respiratory or skin sensitization
no data available

Germ cell mutagenicity
no data available

Carcinogenicity
Carcinogenicity - rat - Implant

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

Reproductive toxicity
no data available

Specific target organ toxicity - single exposure
no data available

Specific target organ toxicity - repeated exposure
no data available

Aspiration hazard
no data available

Potential health effects

Inhalation May be harmful if inhaled. May cause respiratory tract irritation.

Ingestion May be harmful if swallowed.

Skin May be harmful if absorbed through skin. May cause skin irritation.

Eyes May cause eye irritation.

Additional Information
RTECS: Not available
12. ECOLOGICAL INFORMATION

12.1 Toxicity
  no data available

12.2 Persistence and degradability
  no data available

12.3 Bioaccumulative potential
  no data available

12.4 Mobility in soil
  no data available

12.5 Results of PBT and vPvB assessment
  no data available

12.6 Other adverse effects
  no data available

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods
  Product
  Offer surplus and non-recyclable solutions to a licensed disposal company.

  Contaminated packaging
  Dispose of as unused product.

14. TRANSPORT INFORMATION

14.1 UN number
  ADR/RID: -                  IMDG: -                  IATA: -

14.2 UN proper shipping name
  ADR/RID: Not dangerous goods
  IMDG: Not dangerous goods
  IATA: Not dangerous goods

14.3 Transport hazard class(es)
  ADR/RID: -                  IMDG: -                  IATA: -

14.4 Packaging group
  ADR/RID: -                  IMDG: -                  IATA: -

14.5 Environmental hazards
  ADR/RID: no                  IMDG Marine pollutant: no
  IATA: no

14.6 Special precautions for user
  no data available

15. REGULATORY INFORMATION

This safety datasheet complies with the requirements of Regulation (EC) No. 1907/2006.

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture
  no data available

15.2 Chemical Safety Assessment
  no data available

16. OTHER INFORMATION

Further information
Copyright 2012 Sigma-Aldrich Co. License granted to make unlimited paper copies for internal use only.
The above information is believed to be correct but does not purport to be all inclusive and shall be
used only as a guide. The information in this document is based on the present state of our knowledge
and is applicable to the product with regard to appropriate safety precautions. It does not represent any
guarantee of the properties of the product. Sigma-Aldrich Co., shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale.
Section 1: Product and Company Identification

Product Name: ADDOVATE EM 132D
Article Number: 1594242
Product Code: 220190
Chemical Family: Polyether Alcohol
Chemical Name: Polyether Polyol
CAS Number: 69227-21-0

Section 2: Composition/Information on Ingredients

HAZARDOUS INGREDIENTS

<table>
<thead>
<tr>
<th>Ingredient Name/ CAS Number</th>
<th>Exposure Limits</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Polyether Alcohol 69227-21-0</td>
<td>OSHA (PEL): Not Established</td>
<td>0% 100%</td>
</tr>
<tr>
<td></td>
<td>ACGIH (TLV): Not Established</td>
<td></td>
</tr>
</tbody>
</table>

Section 3: Hazards Identification

EMERGENCY OVERVIEW

CAUTION! Non-regulated. **Color:** Colorless to Yellow  **Form:** Liquid  **Odor:** Odorless to weak odor
May cause eye, skin, and respiratory tract irritation. Water may cause frothing. Use cold water spray to cool fire-exposed containers to minimize the risk of rupture. Irritating gases/fumes may be given off during burning or thermal decomposition.

POTENTIAL HEALTH EFFECTS
Route(s) of Entry: Inhalation, Skin Contact, Eye Contact

HUMAN EFFECTS AND SYMPTOMS OF OVEREXPOSURE

General Effects of Exposure
Acute Effects of Exposure: This product at ambient temperatures, under normal working conditions, using good industrial hygiene practices is not expected to present a problem. However, if heated, processed, or sprayed/misted, this product may cause irritation of the mucous membranes of the upper respiratory tract. Liquid contact with the skin may cause irritation. This material can be absorbed through the skin. However, no information is available on the extent of systemic effects in humans. The lethal dose from dermal absorption in rabbits was 4.6 gm/kg. Liquid and vapor contact with the eyes may cause irritation, redness, swelling, discharge and/or corneal clouding. Ingestion is not a likely route of exposure. However, if ingested this product could cause nausea, diarrhea, pain and other gastrointestinal disturbances.

Chronic Effects of Exposure: Prolonged or repeated exposure with the concentrated solution may cause dermatitis, with drying and cracking of the skin due to the defatting action of the solution. Repeated and prolonged exposure to the mist from this product may cause conjunctivitis.

Carcinogenic Components:
NTP: None
IARC: None
OSHA: None

Medical Conditions Aggravated by Exposure: May aggravate existing skin disorders.

Section 4: First Aid Measures

First Aid for Eye: In case of contact, flush eyes with large quantities of water for at least 15 minutes. Get medical attention if irritation develops or persists.

First Aid for Skin: Immediately remove contaminated clothing and shoes. In case of skin contact, wash affected areas with soap and water. Wash clothing and clean shoes before reuse. Get medical attention if irritation develops or persists.

First Aid for Inhalation: If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

First Aid for Ingestion: Give victim one or two glasses of water or milk. If material is ingested, do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Get medical attention. Should vomiting occur, keep patients head
Note to Physician: Treat symptomatically.

Section 5: Fire Fighting Measures

**Flash Point:** 365 °F Pensky-Martens Closed Cup (ASTM D-93)

**Flammable Limits:**
- **Upper Explosion Limit (UEL %):** Not Established
- **Lower Explosion Limit (LEL %):** Not Established

**Auto-ignition Temperature:** 698 °F (370 °C) DIN 51794

**Extinguishing Media:**
- Suitable: Water, Carbon Dioxide, Dry Chemical, Foam

**Special Fire Fighting Procedures:**
A solid stream of water directed into the burning material could spread the fire. Full emergency equipment with self-contained breathing apparatus and full protective clothing should be worn by firefighters. Use cold water spray to cool fire exposed containers. Material supports combustion. During a fire, irritating and toxic gases may be generated by thermal decomposition or combustion.

**Unusual Fire/Explosion Hazards:** None known.

Section 6: Accidental Release Measures

**Spill or Leak Procedures:** Extinguish all ignition sources. Emergency clean-up personnel should wear appropriate protection when entering the spill area for clean-up. Do not allow spilled or released material to enter ground water, waste water or soil. Cover spill with absorbent material, such as sand, sweeping compound or diatomaceous earth; collect material for disposal. Spill area can be washed with water. Ventilate area to remove vapors.

Section 7: Handling and Storage

**Storage Temperature:**
- **Maximum:** 122 °F (50 °C)

**Shelf Life:** 6 Months

**Special Sensitivity:** Moisture.

**Handling/Storage Precautions:** Handle in accordance with good industrial hygiene and safety practices. Keep container tightly closed when not in use. Avoid
Section 8: Exposure Controls/Personal Protection

Personal Protection Equipment

Eye Protection Requirements: Chemical safety goggles. In a splash hazard environment chemical goggles should be used in combination with a full face-shield.

Skin Protection Requirements: Permeation resistant gloves (neoprene, nitrile, or PVC) and impervious clothing (long sleeve shirts) are recommended. Cover as much of the exposed skin area as possible with appropriate clothing, coveralls, apron and boots. If skin creams are used, keep the area covered by the cream to a minimum.

Ventilation Requirements: None required during handling but necessary during processing.

Respirator Requirements: The specific respirator selected must be based on contamination levels found in the work place, must not exceed the working limits of the respirator and be jointly approved by the National Institute for Occupational Safety and Health and the Mine Safety and Health Administration (NIOSH-MSHA). Air purifying respirator equipped with a full-face organic vapor and dust/mist cartridge if vapors are near or exceeding the exposure limits listed in Section 2. In areas of high concentrations, confined space or other poorly ventilated areas and for large spill clean-up sites, fresh air-line respirators or self-contained breathing apparatus should be used. Observe OSHA regulations for respirator use (29 CFR 1910.134.)

Additional Protective Measures: Safety showers and eyewash stations should be accessible to the work area.

Section 9: Physical and Chemical Properties

Physical Form: Liquid
Color: Colorless to Yellow
Odor: Odorless to weak odor
pH: Approximately 4.5
Boiling Point: Not Established
Melting/Freezing Point: Not Established
Viscosity: 115 mPa.s @ 75 °F (25 °C)
Solubility in Water: Soluble
Specific Gravity: 1 @ 68 °F (20 °C)
Bulk Density: Not Established
Vapor Pressure: 9 mmHg @ 68 °F (20 °C)
Vapor Density: Not Established
VOC by Weight: Not Established

Section 10: Stability and Reactivity
Stability: Stable

Hazardous Polymerization: Will not occur

Substances to Avoid: Oxidizing materials and isocyanates.

Conditions to Avoid: None known.

Decomposition Products: By fire - CO, CO2, oxides of nitrogen, and other undetermined aliphatic fragments.

Section 11: Toxicological Information

Toxicity Data for ADDOVATE EM 132D
Acute oral toxicity: LD50 = > 5,000 mg/kg (Rat)

Eye Irritation: Non-irritating

Skin Irritation: Non-irritating

Toxicity Data for Polyether Alcohol
Toxicity Note: No data available for this component.

Section 12: Ecological Information

Ecological Data for ADDOVATE EM 132D
Ecological Note: Water Pollution Class WGK 1 - slightly hazardous to water (German Water Resources Act)

Ecological Data for Polyether Alcohol
Ecological Note: No data available for this component.

Section 13: Disposal Considerations

Waste Disposal Method: Disposal must be in compliance with federal, state and local environmental control regulations. If incinerated, toxic and corrosive combustion gases must be properly handled.

Empty Container Precautions: Empty container retains product residue and can be hazardous. Do not pressurize, cut, weld, braze, solder, drill, grind or expose containers to heat, flame, sparks, static electricity, or other sources of ignition. Recondition or dispose of empty container in accordance with government regulations.

Section 14: Transportation Information
Technical shipping name: Polyether Alcohol

Freight Class
   Bulk: Chemicals, N.O.I. (NMFC 60000)
   Package: Chemicals, N.O.I. (NMFC 60000)

Product Label: Product Label Established

**Domestic Surface Transportation (DOT)**
Hazard Class or Division: Non-Regulated

**Marine Transportation (IMO / IMDG)**
Hazard Class Division: Non-Regulated
Number:

**Air Transportation (ICAO / IATA)**
Hazard Class Division: Non-Regulated
Number:

**Section 15: Regulatory Information**

**United States Federal Regulations**

OSHA Hazcom Standard: Hazardous
Rating:

TSCA Inventory List: On TSCA Inventory

**CERCLA Hazardous Substance:**

<table>
<thead>
<tr>
<th>Component(s)</th>
<th>Reportable Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td></td>
</tr>
</tbody>
</table>

**SARA Title III**

**SARA Section 302 Extremely Hazardous Substances:**

<table>
<thead>
<tr>
<th>Component(s)/CAS Number</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>Min.</td>
</tr>
</tbody>
</table>

**SARA Section 311/312 Hazard Categories:**

Immediate Health Hazard

**SARA Section 313 Toxic Chemicals:**

<table>
<thead>
<tr>
<th>Component(s)/CAS Number</th>
<th>Reporting Threshold</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>Min.</td>
</tr>
</tbody>
</table>

**RCRA Status:**
If discarded in its purchased form, this product would not be a hazardous waste either by listing or by characteristic. However, under RCRA, it is the responsibility of the product user to determine at the time of disposal, whether a material containing the product or derived from the product should be classified as a hazardous waste. (40 CFR 261.20-24)
The following chemicals are specifically listed by individual states; other product specific health and safety data in other sections of the MSDS may also be applicable for state requirements. For details on your regulatory requirements you should contact the appropriate agency in your state.

**State Right-to-Know Information**

<table>
<thead>
<tr>
<th>Component(s)/</th>
<th>CAS Number</th>
<th>State Code</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Polyether Alcohol</td>
<td>69227-21-0</td>
<td>PA-N, NJ-N</td>
<td>0% - 100%</td>
</tr>
</tbody>
</table>

**State Code Translation Table**

- PA-N = Pennsylvania Non-hazardous
- NJ-N = New Jersey Other - includes predominant ingredients

**Section 16: Other Information**

**HMIS Rating**

<table>
<thead>
<tr>
<th>Health</th>
<th>Flammability</th>
<th>Reactivity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>

0=Minimal  1=Slight  2=Moderate  3=Serious  4=Severe  
*Chronic Health Hazard

RHEIN CHEMIE CORPORATION’s method of hazard communication is comprised of Product Labels and Material Safety Data Sheets. HMIS and NFPA ratings are provided by RHEIN CHEMIE CORPORATION as a customer service.

Contact: HES Dept.
Phone: (440) 285-3547
MSDS Number: R36590
Version Date: 12/14/2007
MSDS Version: 2.4

This information is furnished without warranty, expressed or implied, except that it is accurate to the best knowledge of RHEIN CHEMIE CORPORATION. The data on this sheet relates only to the specific material designated herein. RHEIN CHEMIE CORPORATION assumes no legal responsibility for use or reliance upon these data.

Indicates Relevant Change Made.
SECTION 1. IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING

Product Identifier
Product Description: Sodium polyphosphate
Cat No. 390930000; 390930010; 390930050; 390932500
Synonyms Sodium metaphosphate; Calgon; Graham’s salt

Relevant identified uses of the substance or mixture and uses advised against
Recommended Use Laboratory chemicals
Uses advised against No Information available

Details of the supplier of the safety data sheet
Company
Acros Organics BVBA
Janssen Pharmaceuticaaln 3a
2440 Geel, Belgium
E-mail address begel.sdsdesk@thermofisher.com

Emergency Telephone Number
For information in the US, call: 001-800-ACROS-01
For information in Europe, call: +32 14 57 52 11
Emergency Number, Europe: +32 14 57 52 99
Emergency Number, US: 001-201-796-7100
CHEMTREC Phone Number, US: 001-800-424-9300
CHEMTREC Phone Number, Europe: 001-703-527-3887

SECTION 2. HAZARDS IDENTIFICATION

Classification of the substance or mixture
REGULATION (EC) No 1272/2008
Skin Corrosion/irritation Category 2
Serious Eye Damage/Eye Irritation Category 2
Specific target organ systemic toxicity (single exposure) Category 3

Classification according to EU Directives 67/548/EEC or 1999/45/EC
For the full text of the R-phrases and H-Statements mentioned in this Section, see Section 16
Symbol(s) Xi - Irritant
R-phrase(s) none
Risk Combination Phrases R36/37/38 - Irritating to eyes, respiratory system and skin
SECTION 2. HAZARDS IDENTIFICATION

Label Elements

Signal Word Warning

Hazard Statements
H335 - May cause respiratory irritation
H319 - Causes serious eye irritation
H315 - Causes skin irritation

Precautionary Statements - EU (§28, 1272/2008)
P261 - Avoid breathing dust/ fume/ gas/ mist/ vapors/ spray
P302 + P352 - IF ON SKIN: Wash with plenty of soap and water
P280 - Wear protective gloves/ protective clothing/ eye protection/ face protection
P305 + P351 + P338 - IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing

Other Hazards
No information available.

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Metaphosphoric acid, sodium salt</td>
<td>EEC No. 256-779-4</td>
<td>95-70</td>
<td>50813-16-6</td>
<td>Xi; R36/37/38</td>
<td>STOT SE 3 (H335) Skin Irrit. 2 (H315) Eye Irrit. 2 (H319)</td>
<td>-</td>
</tr>
</tbody>
</table>

For the full text of the R-phrases and H-Statements mentioned in this Section, see Section 16

SECTION 4. FIRST AID MEASURES

ACR39093
SECTION 4. FIRST AID MEASURES

Description of first aid measures

Eye Contact
Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Obtain medical attention.

Skin Contact
Wash off immediately with soap and plenty of water while removing all contaminated clothes and shoes. Obtain medical attention.

Ingestion
Clean mouth with water. Get medical attention.

Inhalation
Remove from exposure, lie down. Move to fresh air. If breathing is difficult, give oxygen. If not breathing, give artificial respiration. Obtain medical attention.

Notes to Physician
Treat symptomatically

SECTION 5. FIRE-FIGHTING MEASURES

Extinguishing media

Suitable Extinguishing Media

Extinguishing media which must not be used for safety reasons
No information available.

Special hazards arising from the substance or mixture
Thermal decomposition can lead to release of irritating gases and vapors

Advice for fire-fighters
As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures
Ensure adequate ventilation

Environmental precautions
Prevent further leakage or spillage if safe to do so

Methods and material for containment and cleaning up
Sweep up or vacuum up spillage and collect in suitable container for disposal. Do not let this chemical enter the environment.

SECTION 7. HANDLING AND STORAGE

Precautions for Safe Handling
Avoid contact with skin and eyes. Do not breathe dust. Do not breathe vapors or spray mist. Do not ingest.

**Conditions for safe storage, including any incompatibilities**

Keep in a dry, cool and well-ventilated place. Keep container tightly closed.

**Specific End Uses**

---

**SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION**

**Control parameters**

**Exposure limits**

This product, as supplied, does not contain any hazardous materials with occupational exposure limits established by the region specific regulatory bodies.

**Biological limit values**

This product, as supplied, does not contain any hazardous materials with biological limits established by the region specific regulatory bodies.

**Derived No Effect Level (DNEL)**

No information available.

**Predicted No Effect Concentration (PNEC)**

No information available.

**Exposure controls**

**Engineering Measures**

Ensure adequate ventilation, especially in confined areas. Ensure that eyewash stations and safety showers are close to the workstation location.

**Personal protective equipment**

- **Eye Protection**
  - Goggles
- **Hand Protection**
  - Protective gloves
- **Skin and body protection**
  - Wear appropriate protective gloves and clothing to prevent skin exposure
- **Respiratory Protection**
  - Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced

**Hygiene Measures**

Handle in accordance with good industrial hygiene and safety practice

**Environmental exposure controls**

No information available.

---

**SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES**

**Physical State**

- Powder, Solid

**Appearance**

- White

**pH**

- No information available.

**Boiling Point/Range**

- No information available.

**Melting Point/Range**

- 600°C / 1112°F

**Flash Point**

- No information available.

**Autoignition Temperature**

- No information available.

**Water Solubility**

- 1000g/L (20°C)

**Molecular Formula**

- (NaPO3)n
SECTION 10. STABILITY AND REACTIVITY

Reactivity
Chemical Stability
Hygroscopic.

Possibility of Hazardous Reactions

Hazardous Polymerization
No information available.

Hazardous Reactions
No information available.

Conditions to Avoid
Incompatible products, Exposure to moist air or water.

Incompatible Materials
Strong oxidizing agents.

Hazardous Decomposition Products
Highly toxic fumes. Oxides of phosphorus. Sodium oxides.

SECTION 11. TOXICOLOGICAL INFORMATION

Information on Toxicological Effects

Acute Toxicity

Product Information
No acute toxicity information is available for this product

Component Information

Chronic Toxicity

Carcinogenicity
There are no known carcinogenic chemicals in this product

Sensitization
No information available.

Mutagenic Effects
No information available.

Reproductive Effects
No information available.

Developmental Effects
No information available.

Target Organs
No information available.

Other Adverse Effects
The toxicological properties have not been fully investigated.

Endocrine Disruptor Information
None known

ACR39093
SECTION 12. ECOLOGICAL INFORMATION

Toxicity
Ecotoxicity effects
Do not empty into drains

Persistence and degradability
No information available

Bioaccumulative potential
No information available.

Mobility in soil
No information available.

Results of PBT and vPvB assessment

Other adverse effects
No information available

SECTION 13. DISPOSAL CONSIDERATIONS

Waste treatment methods

Waste from Residues / Unused Products
Dispose of in accordance with local regulations

Contaminated Packaging
Empty containers should be taken to local recyclers for disposal

SECTION 14. TRANSPORT INFORMATION

IMDG/IMO
Not regulated

ADR
Not regulated

IATA
Not regulated
SECTION 15. REGULATORY INFORMATION

Safety, health and environmental regulations/legislation specific for the substance or mixture

International Inventories

<table>
<thead>
<tr>
<th>Component</th>
<th>EINECS</th>
<th>ELINCS</th>
<th>NLP</th>
<th>TSCA</th>
<th>DSL</th>
<th>NDSL</th>
<th>PICCS</th>
<th>ENCS</th>
<th>CHINA</th>
<th>AICS</th>
<th>KECL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metaphosphoric acid, sodium salt</td>
<td>256-779-4</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

Legend

TSCA - United States Toxic Substances Control Act Section 8(b) Inventory
EINECS/ELINCS - European Inventory of Existing Commercial Chemical Substances/EU List of Notified Chemical Substances
DSL/NDSL - Canadian Domestic Substances List/Non-Domestic Substances List
PICCS - Philippines Inventory of Chemicals and Chemical Substances
ENCs - Japan Existing and New Chemical Substances
CHINA - China Inventory of Existing Chemical Substances
AICS - Inventory of Chemical Substances
KECL - Existing and Evaluated Chemical Substances

Chemical Safety Assessment

SECTION 16. OTHER INFORMATION

Full text of R-phrases referred to under sections 2 and 3
R36/37/38 - Irritating to eyes, respiratory system and skin

Revision Date 15-Dec-2011
Revision Summary Not applicable

This safety data sheet complies with the requirements of Regulation (EC) No. 1907/2006

Disclaimer
The information provided on this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guide for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered as a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other material or in any process, unless specified in the text.

End of Safety Data Sheet
SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers
   Product name: Silicon dioxide
   Product Number: S5631
   Brand: Sigma-Aldrich
   REACH No.: A registration number is not available for this substance as the substance or its uses are exempted from registration, the annual tonnage does not require a registration or the registration is envisaged for a later registration deadline.
   CAS-No.: 14808-60-7

1.2 Relevant identified uses of the substance or mixture and uses advised against
   Identified uses: Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet
   Company: Sigma-Aldrich Chemie GmbH
   Riedstrasse 2
   D-89555 STEINHEIM
   Telephone: +49 89-6513-1444
   Fax: +49 7329-97-2319
   E-mail address: eurtechserv@sidal.com

1.4 Emergency telephone number
   Emergency Phone #: 0800 181 7059 (CHEMTREC Deutschland)
   +49 (0)696 43508409 (CHEMTREC weltweit)

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture
   Classification according to Regulation (EC) No 1272/2008
   Specific target organ toxicity - repeated exposure, Inhalation (Category 1), Lungs, H372
   For the full text of the H-Statements mentioned in this Section, see Section 16.

Classification according to EU Directives 67/548/EEC or 1999/45/EC
   Xn Harmful
   R48/20
   For the full text of the R-phrases mentioned in this Section, see Section 16.

2.2 Label elements
   Labelling according Regulation (EC) No 1272/2008
   Pictogram
   Signal word: Danger
   Hazard statement(s): Causes damage to organs (Lungs) through prolonged or repeated exposure if inhaled.
Precautionary statement(s)
P314 Get medical advice/attention if you feel unwell.

Supplemental Hazard none

2.3 Other hazards
This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

SECTION 3: Composition/information on ingredients

3.1 Substances
Synonyms:
- Silica
- Quartz
- Sand
- Cristobalite

Formula: \( \text{O}_2\text{Si} \)
Molecular weight: \( 60.08 \text{ g/mol} \)
CAS-No.: 14808-60-7
EC-No.: 238-878-4

### Hazardous ingredients according to Regulation (EC) No 1272/2008

<table>
<thead>
<tr>
<th>Component</th>
<th>Classification</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quartz</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CAS-No.</td>
<td>14808-60-7</td>
<td>STOT RE 1; H372 &lt;= 100 %</td>
</tr>
<tr>
<td>EC-No.</td>
<td>238-878-4</td>
<td></td>
</tr>
</tbody>
</table>

### Hazardous ingredients according to Directive 1999/45/EC

<table>
<thead>
<tr>
<th>Component</th>
<th>Classification</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quartz</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CAS-No.</td>
<td>14808-60-7</td>
<td>Xn, R48/20    &lt;= 100 %</td>
</tr>
<tr>
<td>EC-No.</td>
<td>238-878-4</td>
<td></td>
</tr>
</tbody>
</table>

For the full text of the H-Statements and R-Phrases mentioned in this Section, see Section 16

SECTION 4: First aid measures

4.1 Description of first aid measures

**General advice**
Consult a physician. Show this safety data sheet to the doctor in attendance.

**If inhaled**
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

**In case of skin contact**
Wash off with soap and plenty of water. Take victim immediately to hospital. Consult a physician.

**In case of eye contact**
Flush eyes with water as a precaution.

**If swallowed**
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available
SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
silicon oxides

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
No data available

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
Use personal protective equipment. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust. For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

6.3 Methods and materials for containment and cleaning up
Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid formation of dust and aerosols. Provide appropriate exhaust ventilation at places where dust is formed. For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Store in cool place. Keep container tightly closed in a dry and well-ventilated place. Storage class (TRGS 510): Non-combustible, acute toxic Cat.3 / toxic hazardous materials or hazardous materials causing chronic effects

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Components with workplace control parameters

8.2 Exposure controls

Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).
**Skin protection**
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove’s outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

The selected protective gloves have to satisfy the specifications of EU Directive 89/686/EEC and the standard EN 374 derived from it.

Full contact  
Material: Nitrile rubber  
Minimum layer thickness: 0.11 mm  
Break through time: 480 min  
Material tested: Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact  
Material: Nitrile rubber  
Minimum layer thickness: 0.11 mm  
Break through time: 480 min  
Material tested: Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de,  
test method: EN374  
If used in solution, or mixed with other substances, and under conditions which differ from EN 374,  
contact the supplier of the CE approved gloves. This recommendation is advisory only and must  
be evaluated by an industrial hygienist and safety officer familiar with the specific situation of  
anticipated use by our customers. It should not be construed as offering an approval for any  
specific use scenario.

**Body Protection**  
Complete suit protecting against chemicals. The type of protective equipment must be selected  
according to the concentration and amount of the dangerous substance at the specific workplace.

**Respiratory protection**  
Where risk assessment shows air-purifying respirators are appropriate use a full-face particle  
respirator type N99 (US) or type P2 (EN 143) respirator cartridges as a backup to engineering  
controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use  
respirators and components tested and approved under appropriate government standards such as  
NIOSH (US) or CEN (EU).

**Control of environmental exposure**  
Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

---

**SECTION 9: Physical and chemical properties**

**9.1 Information on basic physical and chemical properties**

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Appearance</strong></td>
<td>Form: solid</td>
</tr>
<tr>
<td><strong>Odour</strong></td>
<td>No data available</td>
</tr>
<tr>
<td><strong>Odour Threshold</strong></td>
<td>No data available</td>
</tr>
<tr>
<td><strong>pH</strong></td>
<td>No data available</td>
</tr>
<tr>
<td><strong>Melting point/freezing point</strong></td>
<td>Melting point/range: 1.610 °C - lit.</td>
</tr>
<tr>
<td><strong>Initial boiling point and boiling range</strong></td>
<td>No data available</td>
</tr>
<tr>
<td><strong>Flash point</strong></td>
<td>No data available</td>
</tr>
<tr>
<td><strong>Evaporation rate</strong></td>
<td>No data available</td>
</tr>
<tr>
<td><strong>Flammability (solid, gas)</strong></td>
<td>No data available</td>
</tr>
<tr>
<td><strong>Upper/lower flammability or</strong></td>
<td>No data available</td>
</tr>
</tbody>
</table>

---

Sigma-Aldrich - S5631
explosive limits

k) Vapour pressure | No data available
l) Vapour density | No data available
m) Relative density | 2.6 g/cm³ at 25 °C
n) Water solubility | No data available
o) Partition coefficient: n-octanol/water | No data available

p) Auto-ignition temperature | No data available
q) Decomposition temperature | No data available
r) Viscosity | No data available
s) Explosive properties | No data available
t) Oxidizing properties | No data available

9.2 Other safety information
No data available

SECTION 10: Stability and reactivity

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
No data available

10.5 Incompatible materials
Hydrogen fluoride

10.6 Hazardous decomposition products
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
No data available

Skin corrosion/irritation
No data available

Serious eye damage/eye irritation
No data available

Respiratory or skin sensitisation
No data available

Germ cell mutagenicity
No data available

Carcinogenicity
IARC: 1 - Group 1: Carcinogenic to humans (Quartz)
Reproductive toxicity
No data available

**Specific target organ toxicity - single exposure**
No data available

**Specific target organ toxicity - repeated exposure**
Inhalation - Causes damage to organs through prolonged or repeated exposure. - Lungs

**Aspiration hazard**
No data available

**Additional Information**
RTECS: VV7330000

The chronic health risks are associated with respirable particles of 3-4 um over protracted periods of time. Currently, there is a limited understanding of the mechanisms of quartz toxicity, including its mechanisms for lung carcinogenicity. Additional studies are needed to determine whether the cell transforming activity of quartz is related to its carcinogenic potential.

Lungs - Prolonged inhalation of crystalline silica may result in silicosis, a disabling pulmonary fibrosis characterized by fibrotic changes and miliary nodules in the lungs, a dry cough, shortness of breath, emphysema, decreased chest expansion, and increased susceptibility to tuberculosis. In advanced stages, loss of appetite, pleuritic pain, and total incapacity to work. Advanced silicosis may result in death due to cardiac failure or destruction of lung tissue. Crystalline silica is classified as group 1 "known to be carcinogenic to humans" by IARC and "sufficient evidence" of carcinogenicity by the NTP. - Based on Human Evidence

**SECTION 12: Ecological information**

12.1 **Toxicity**
No data available

12.2 **Persistence and degradability**
No data available

12.3 **Bioaccumulative potential**
No data available

12.4 **Mobility in soil**
No data available

12.5 **Results of PBT and vPvB assessment**
This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

12.6 **Other adverse effects**
No data available

**SECTION 13: Disposal considerations**

13.1 **Waste treatment methods**

**Product**
Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber. Offer surplus and non-recyclable solutions to a licensed disposal company.

**Contaminated packaging**
Dispose of as unused product.

**SECTION 14: Transport information**

14.1 **UN number**
ADR/RID: -  IMDG: -  IATA: -

14.2 **UN proper shipping name**
ADR/RID: Not dangerous goods
14.3 Transport hazard class(es)
   ADR/RID: -   IMDG: -   IATA: -

14.4 Packaging group
   ADR/RID: -   IMDG: -   IATA: -

14.5 Environmental hazards
   ADR/RID: no   IMDG Marine pollutant: no   IATA: no

14.6 Special precautions for user
   No data available

SECTION 15: Regulatory information
   This safety datasheet complies with the requirements of Regulation (EC) No. 1907/2006.

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture

15.2 Chemical Safety Assessment
   For this product a chemical safety assessment was not carried out

SECTION 16: Other information

Full text of H-Statements referred to under sections 2 and 3.
H372 Causes damage to organs through prolonged or repeated exposure if inhaled.
STOT RE Specific target organ toxicity - repeated exposure

Full text of R-phrases referred to under sections 2 and 3
Xn Harmful
R48/20 Harmful: danger of serious damage to health by prolonged exposure through inhalation.

Further information
   Copyright 2015 Sigma-Aldrich Co. LLC. License granted to make unlimited paper copies for internal use only.
   The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.
SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers
   Product name : Sodium anthraquinone-2-sulfonate
   Product Number : 743038
   Brand : Aldrich
   REACH No. : A registration number is not available for this substance as the substance or its uses are exempted from registration, the annual tonnage does not require a registration or the registration is envisaged for a later registration deadline.
   CAS-No. : 131-08-8

1.2 Relevant identified uses of the substance or mixture and uses advised against
   Identified uses : Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet
   Company : Sigma-Aldrich Chemie GmbH
              Riedstrasse 2
              D-89555 STEINHEIM
   Telephone : +49 89-6513-1444
   Fax : +49 7329-97-2319
   E-mail address : eurtechserv@sial.com

1.4 Emergency telephone number
   Emergency Phone # : 0800 181 7059 (CHEMTREC Deutschland)
                        +49 (0)696 43508409 (CHEMTREC weltweit)

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture
   Not a hazardous substance or mixture according to Regulation (EC) No. 1272/2008.

2.2 Label elements
   Not a hazardous substance or mixture according to Regulation (EC) No. 1272/2008.

2.3 Other hazards
   This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

SECTION 3: Composition/information on ingredients

3.1 Substances
   Synonyms : 9,10-Dihydro-9,10-dioxo-2-anthracenesulfonic acid sodium salt
               Anthraquinone-2-sulfonic acid sodium salt
   Formula : C_{14}H_{7}NaO_{5}S
Molecular weight : 310.26 g/mol
CAS-No. : 131-08-8
EC-No. : 205-009-5

No components need to be disclosed according to the applicable regulations.

SECTION 4: First aid measures

4.1 Description of first aid measures

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration.

In case of skin contact
Wash off with soap and plenty of water.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
No data available

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
No data available

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
Avoid dust formation. Avoid breathing vapours, mist or gas.
For personal protection see section 8.

6.2 Environmental precautions
No special environmental precautions required.

6.3 Methods and materials for containment and cleaning up
Sweep up and shovel. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling
Provide appropriate exhaust ventilation at places where dust is formed.
For precautions see section 2.2.
7.2 Conditions for safe storage, including any incompatibilities
Store in cool place. Keep container tightly closed in a dry and well-ventilated place.

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

SECTION 8: Exposure controls/personal protection

8.1 Control parameters
Components with workplace control parameters

8.2 Exposure controls
Appropriate engineering controls
General industrial hygiene practice.

Personal protective equipment

Eye/face protection
Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove’s outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

The selected protective gloves have to satisfy the specifications of EU Directive 89/686/EEC and the standard EN 374 derived from it.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0,11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0,11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Choose body protection in relation to its type, to the concentration and amount of dangerous substances, and to the specific work-place. The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Respiratory protection is not required. Where protection from nuisance levels of dusts are desired, use type N95 (US) or type P1 (EN 143) dust masks. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
No special environmental precautions required.
### SECTION 9: Physical and chemical properties

#### 9.1 Information on basic physical and chemical properties

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Appearance</strong></td>
<td>Form: powder, crystalline</td>
</tr>
<tr>
<td></td>
<td>Colour: beige, light yellow</td>
</tr>
<tr>
<td><strong>Odour</strong></td>
<td>No data available</td>
</tr>
<tr>
<td><strong>Odour Threshold</strong></td>
<td>No data available</td>
</tr>
<tr>
<td><strong>pH</strong></td>
<td>No data available</td>
</tr>
<tr>
<td><strong>Melting point/freezing point</strong></td>
<td>No data available</td>
</tr>
<tr>
<td><strong>Initial boiling point and boiling range</strong></td>
<td>No data available</td>
</tr>
<tr>
<td><strong>Flash point</strong></td>
<td>No data available</td>
</tr>
<tr>
<td><strong>Evaporation rate</strong></td>
<td>No data available</td>
</tr>
<tr>
<td><strong>Flammability (solid, gas)</strong></td>
<td>No data available</td>
</tr>
<tr>
<td><strong>Upper/lower flammability or explosive limits</strong></td>
<td>No data available</td>
</tr>
<tr>
<td><strong>Vapour pressure</strong></td>
<td>No data available</td>
</tr>
<tr>
<td><strong>Vapour density</strong></td>
<td>No data available</td>
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<tr>
<td><strong>Relative density</strong></td>
<td>No data available</td>
</tr>
<tr>
<td><strong>Water solubility</strong></td>
<td>No data available</td>
</tr>
<tr>
<td><strong>Partition coefficient: n-octanol/water</strong></td>
<td>No data available</td>
</tr>
<tr>
<td><strong>Auto-ignition temperature</strong></td>
<td>No data available</td>
</tr>
<tr>
<td><strong>Decomposition temperature</strong></td>
<td>No data available</td>
</tr>
<tr>
<td><strong>Viscosity</strong></td>
<td>No data available</td>
</tr>
<tr>
<td><strong>Explosive properties</strong></td>
<td>No data available</td>
</tr>
<tr>
<td><strong>Oxidizing properties</strong></td>
<td>No data available</td>
</tr>
</tbody>
</table>

#### 9.2 Other safety information

No data available

### SECTION 10: Stability and reactivity

#### 10.1 Reactivity

No data available

#### 10.2 Chemical stability

Stable under recommended storage conditions.

#### 10.3 Possibility of hazardous reactions

No data available

#### 10.4 Conditions to avoid

No data available

#### 10.5 Incompatible materials

Strong oxidizing agents
10.6 Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Carbon oxides, Sulphur oxides, Sodium oxides
Other decomposition products - No data available
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Guinea pig - 21.000 mg/kg
Inhalation: No data available
LD50 Intraperitoneal - Rat - 730 mg/kg

Skin corrosion/irritation
No data available

Serious eye damage/eye irritation
No data available

Respiratory or skin sensitisation
No data available

Germ cell mutagenicity
No data available

Carcinogenicity
IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

Reproductive toxicity
No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

Additional Information
RTECS: CB1095550
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

SECTION 12: Ecological information

12.1 Toxicity
No data available

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
This substance/mixture contains no components considered to be either persistent, bioaccumulative and
toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

12.6 Other adverse effects
No data available

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product
Offer surplus and non-recyclable solutions to a licensed disposal company.

Contaminated packaging
Dispose of as unused product.

SECTION 14: Transport information

14.1 UN number
ADR/RID: - IMDG: - IATA: -

14.2 UN proper shipping name
ADR/RID: Not dangerous goods IMDG: Not dangerous goods IATA: Not dangerous goods

14.3 Transport hazard class(es)
ADR/RID: - IMDG: - IATA: -

14.4 Packaging group
ADR/RID: - IMDG: - IATA: -

14.5 Environmental hazards
ADR/RID: no IMDG Marine pollutant: no IATA: no

14.6 Special precautions for user
No data available

SECTION 15: Regulatory information

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture
This safety datasheet complies with the requirements of Regulation (EC) No. 1907/2006.

15.2 Chemical safety assessment
For this product a chemical safety assessment was not carried out

SECTION 16: Other information

Further information
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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.
SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers
   Product name : Silica gel

   Product Number : 236772
   Brand : Sigma-Aldrich
   REACH No. : A registration number is not available for this substance as the substance or its uses are exempted from registration, the annual tonnage does not require a registration or the registration is envisaged for a later registration deadline.
   CAS-No. : 112926-00-8

1.2 Relevant identified uses of the substance or mixture and uses advised against
   Identified uses : Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet
   Company : Sigma-Aldrich Chemie GmbH
              Riedstrasse 2
              D-89555 STEINHEIM
   Telephone : +49 89-6513-1444
   Fax : +49 7329-97-2319
   E-mail address : eurtechserv@sigal.com

1.4 Emergency telephone number
   Emergency Phone # : 0800 181 7059 (CHEMTREC Deutschland)
                        +49 (0)696 43508409 (CHEMTREC weltweit)

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture
   Not a hazardous substance or mixture according to Regulation (EC) No. 1272/2008. This substance is not classified as dangerous according to Directive 67/548/EEC.

2.2 Label elements
   This substance is not classified as dangerous according to Directive 67/548/EEC.

2.3 Other hazards - none

SECTION 3: Composition/information on ingredients

3.1 Substances
   Formula : SiO₂
   CAS-No. : 112926-00-8
   EC-No. : 231-545-4

   No components need to be disclosed according to the applicable regulations.
SECTION 4: First aid measures

4.1 Description of first aid measures

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration.

In case of skin contact
Wash off with soap and plenty of water.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
no data available

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
no data available

5.3 Advice for firefighters
Wear self-contained breathing apparatus for fire fighting if necessary.

5.4 Further information
no data available

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
Avoid dust formation. Avoid breathing vapours, mist or gas.
For personal protection see section 8.

6.2 Environmental precautions
No special environmental precautions required.

6.3 Methods and materials for containment and cleaning up
Sweep up and shovel. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling
Provide appropriate exhaust ventilation at places where dust is formed.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Store in cool place. Keep container tightly closed in a dry and well-ventilated place.
Hygroscopic.

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated
SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Components with workplace control parameters

8.2 Exposure controls

Appropriate engineering controls
General industrial hygiene practice.

Personal protective equipment

**Eye/face protection**
Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

**Skin protection**
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove’s outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

The selected protective gloves have to satisfy the specifications of EU Directive 89/686/EEC and the standard EN 374 derived from it.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0,11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0,11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

**Body Protection**
Choose body protection in relation to its type, to the concentration and amount of dangerous substances, and to the specific work-place., The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

**Respiratory protection**
Respiratory protection is not required. Where protection from nuisance levels of dusts are desired, use type N95 (US) or type P1 (EN 143) dust masks. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

**Control of environmental exposure**
No special environmental precautions required.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a) Appearance
Form: powder
Colour: white

b) Odour
no data available
c) Odour Threshold  
   no data available

d) pH  
   no data available

e) Melting point/freezing point  
   Melting point/range: > 1.600 °C

f) Initial boiling point and boiling range  
   2.230 °C

g) Flash point  
   not applicable

h) Evaporation rate  
   no data available

i) Flammability (solid, gas)  
   no data available

j) Upper/lower flammability or explosive limits  
   no data available

k) Vapour pressure  
   no data available

l) Vapour density  
   no data available

m) Relative density  
   no data available

n) Water solubility  
   no data available

o) Partition coefficient: n-octanol/water  
   no data available

p) Auto-ignition temperature  
   no data available

q) Decomposition temperature  
   no data available

r) Viscosity  
   no data available

s) Explosive properties  
   no data available

t) Oxidizing properties  
   no data available

9.2 Other safety information  
   no data available

SECTION 10: Stability and reactivity

10.1 Reactivity  
   no data available

10.2 Chemical stability  
   Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions  
   no data available

10.4 Conditions to avoid  
   no data available

10.5 Incompatible materials  
   Strong oxidizing agents

10.6 Hazardous decomposition products  
   Other decomposition products - no data available
   In the event of fire: see section 5
SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
no data available

Skin corrosion/irritation
no data available

Serious eye damage/eye irritation
no data available

Respiratory or skin sensitisation
no data available

Germ cell mutagenicity
no data available

Carcinogenicity
IARC: 3 - Group 3: Not classifiable as to its carcinogenicity to humans (Silica-Amorphous, precipitated)

Reproductive toxicity
no data available

Specific target organ toxicity - single exposure
no data available

Specific target organ toxicity - repeated exposure
no data available

Aspiration hazard
no data available

Additional Information
RTECS: VV7315000

Amorphous silica is not classifiable as to its carcinogenicity to humans (Group 3); however, crystalline silica inhaled in the form of quartz or cristobalite from occupational sources is carcinogenic to humans (Group 1, IARC). Therefore, amorphous silica should be handled as if possessing the same hazards as the crystalline form. To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

SECTION 12: Ecological information

12.1 Toxicity
no data available

12.2 Persistence and degradability
no data available

12.3 Bioaccumulative potential
no data available

12.4 Mobility in soil
no data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects
no data available
SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product
Offer surplus and non-recyclable solutions to a licensed disposal company.

Contaminated packaging
Dispose of as unused product.

SECTION 14: Transport information

14.1 UN number
ADR/RID: -  IMGD: -  IATA: -

14.2 UN proper shipping name
ADR/RID: Not dangerous goods
IMDG: Not dangerous goods
IATA: Not dangerous goods

14.3 Transport hazard class(es)
ADR/RID: -  IMGD: -  IATA: -

14.4 Packaging group
ADR/RID: -  IMGD: -  IATA: -

14.5 Environmental hazards
ADR/RID: no  IMGD Marine pollutant: no  IATA: no

14.6 Special precautions for user
no data available

SECTION 15: Regulatory information

This safety datasheet complies with the requirements of Regulation (EC) No. 1907/2006.

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture
no data available

15.2 Chemical Safety Assessment
For this product a chemical safety assessment was not carried out

SECTION 16: Other information

Further information
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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.
CTD-101K

CTD-101K is a modified anhydride cured epoxy system with excellent performance at cryogenic temperatures, and excellent radiation resistance. It is formulated with a very long pot life to enhance vacuum impregnation and RTM processing. Quoted performance properties are obtained by using the following procedure for mixing and curing the system.

<table>
<thead>
<tr>
<th>MATERIALS</th>
<th>DESIGNATION</th>
<th>PARTS BY WEIGHT</th>
</tr>
</thead>
<tbody>
<tr>
<td>RESIN:</td>
<td>PART A</td>
<td>100.0</td>
</tr>
<tr>
<td>HARDENER:</td>
<td>PART B</td>
<td>90.0</td>
</tr>
<tr>
<td>ACCELERATOR:</td>
<td>PART C</td>
<td>1.5</td>
</tr>
</tbody>
</table>

**MIXING TEMPERATURE:**  40 - 60°C

**MIXING PROCEDURE:** Combine the weighed components into a container equipped with heating and mechanical stirring. Heat and stir the mixture until a clear solution at 40-60°C is obtained. Degass the mix at 27 in Hg for approximately 20 to 40 minutes until bubbles evolve infrequently from the mixture. The system is now ready for application.

**POT LIFE:**

<table>
<thead>
<tr>
<th>Temperature (°C)</th>
<th>Pot Life (Hr)</th>
<th>Viscosity (Cp)</th>
</tr>
</thead>
<tbody>
<tr>
<td>25</td>
<td>145</td>
<td>1300</td>
</tr>
<tr>
<td>40</td>
<td>60</td>
<td>400</td>
</tr>
<tr>
<td>60</td>
<td>20</td>
<td>100</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CURE:</th>
<th>Standard</th>
<th>Accelerated</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 Hrs. @ 110°C</td>
<td>1.5 Hrs. @ 135°C</td>
<td></td>
</tr>
</tbody>
</table>

| POST CURE:      | 16 Hrs. @ 125°C | None          |
1. PRODUCT IDENTIFICATION

Trade Name and Synonyms
CTD-101K PART A

Chemical Name and/or Family or Description
Formulated liquid epoxide resin

CHEMICAL IDENTITY TRADE SECRET. COMPOSITION WILL BE REVEALED TO A HEALTH PROFESSIONAL IN THE CASE OF A MEDICAL EMERGENCY.

2. COMPOSITION/INFORMATION ON INGREDIENTS

Special Health Effects - Carcinogenicity
Not a carcinogen as considered by NTP, IARC, or OSHA.
This product contains less than 50 ppm Epichlorohydrin, a substance known to be a carcinogen in the State of California

<table>
<thead>
<tr>
<th>CHEMICAL NAME</th>
<th>CAS #</th>
<th>RANGE %</th>
<th>EXPOSURE LIMITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Epoxide Resin mixture</td>
<td>Trade secret</td>
<td>100%</td>
<td>OSHA PEL - Not established</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>OSHA STEL - Not established</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>ACGIH TWA - Not established</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>ACGIH STEL - Not established</td>
</tr>
</tbody>
</table>

3. HAZARDS IDENTIFICATION

Emergency Overview: Warning! Causes irritation. May cause allergic skin reactions.
Primary Route(s) of Entry: Dermal

4. FIRST AID MEASURES

EYE
Flush eyes with water for at least 15 min. Get medical attention if irritation occurs.

SKIN CONTACT
Wash with mild soap and plenty of water. Get medical attention if irritation occurs.

INHALATION
Remove to fresh air. If breathing is difficult, get medical attention.

INGESTION
Give 3-4 glasses of water. Do not induce vomiting. Get medical attention.

OVEREXPOSURE EFFECTS
May cause moderate skin and mild eye irritation.

May cause allergic skin reactions.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE Allergy, eczema or skin conditions

5. FIRE-FIGHTING MEASURES

FLASH POINT
> 200°F (> 93°C)

EXTINGUISHING MEDIA
CO₂; dry chemical; water spray; foam

SPECIAL FIREFIGHTING PROCEDURES
Use self-contained breathing apparatus

FIRE AND EXPLOSION HAZARDS
Combustion products may be toxic
6. ACCIDENTAL RELEASE MEASURES

ACCIDENTAL RELEASE, BREAKAGE OR LEAK

Avoid all personal contact. Clean with absorbent material. Put into closeable containers. Flush area with water.

7. HANDLING AND STORAGE

STORAGE TEMPERATURE

Minimum handling temperature for storage.

HANDLING/STORAGE

Store in cool, dry area in closed containers.

Avoid breathing vapor, mist or spray. Use only adequate ventilation. Eye wash and safety shower should be available nearby when product is handled. For industrial use only.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

EYES

Chemical goggles

SKIN

Lab coats or coveralls, and impervious rubber gloves. Use of barrier cream recommended.

INHALATION

Use NIOSH approved respirator suitable for organic vapors.

VENTILATION

General mechanical ventilation and local exhaust.

9. PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL FORM

Liquid

APPEARANCE AND ODOR

Clear, slight odor

BOILING POINT

> 200°C (> 392°F)

SOLUBILITY IN WATER

Insoluble

SPECIFIC GRAVITY

~1.2g/cc

DECOMPOSITION TEMPERATURE

> 200°C (> 392°F)

10. STABILITY AND REACTIVITY

STABILITY

Stable

INCOMPATIBILITIES

Strong oxidizing agents

HAZARDOUS DECOMPOSITION PRODUCTS

Carbon monoxide, carbon dioxide and aldehydes.

HAZARDOUS POLYMERIZATION

Will not occur

CONDITIONS TO AVOID

Strong acids or bases in bulk and elevated temperatures

11. TOXICOLOGICAL INFORMATION

ORAL LD₅₀

> 5000 mg/kg - rat

DERMAL LD₅₀

> 6000 mg/kg - rabbit

SKIN IRRITATION

Moderate irritation - rabbit

EYE IRRITATION

Slight irritation - rabbit

SENSITIZATION

Moderate sensitizer

12. ECOLOGICAL INFORMATION

Data not yet available

13. DISPOSAL CONSIDERATIONS

According to Federal, State, and Local regulations. This product is not considered to be a hazardous waste by RCRA.

14. TRANSPORT INFORMATION

DEPARTMENT OF TRANSPORTATION

Not regulated
15. REGULATORY INFORMATION

OSHA STATUS
Standard 29 CFR 1910.1200. This product is considered to be a hazardous chemical under that standard.

RCRA
Not a hazardous waste under RCRA (40 CFR 261)

TSCA INVENTORY STATUS
Chemical components listed on TSCA Inventory

SARA/TITLE III:
This product does not contain a toxic chemical under SEC. 313 (40 CFR 372)

CERCLA
Not listed

CALIFORNIA PROPOSITION 65
This product contains less than 50 ppm

Epichlorohydrin, a substance known to the State of California to cause cancer.

16. OTHER INFORMATION

FOR TECHNICAL INFORMATION CONTACT:
DR. NASEEM A. MUNSHI
COORDINATOR OF PRODUCT SAFETY

COMPOSITE TECHNOLOGY DEVELOPMENT, INC
1505 COAL CREEK DRIVE
LAFAYETTE, CO 80026
(303) 664-0394

ISSUE DATE: 01/05/99
REVISION DATE & NO.:

THE INFORMATION AND RECOMMENDATIONS CONTAINED HEREIN ARE BASED UPON DATA BELIEVED TO BE ACCURATE. HOWEVER, NO GUARANTEE OR WARRANTY OF ANY KIND EXPRESSED OR IMPLIED IS MADE WITH RESPECT TO THE INFORMATION CONTAINED HEREIN.
***MATERIAL SAFETY DATA SHEET***

COMPOSITE TECHNOLOGY DEVELOPMENT, INC.
1505 COAL CREEK DRIVE
LAFAYETTE, COLORADO 80026

EMERGENCY TELEPHONE NUMBER: (303) 664 0394

1. PRODUCT IDENTIFICATION

Trade Name and Synonyms
CTD-101K PART B

Chemical Name and/or Family or Description
Formulated liquid hardener

CHEMICAL IDENTITY TRADE SECRET. COMPOSITION WILL BE REVEALED TO A HEALTH PROFESSIONAL IN THE CASE OF A MEDICAL EMERGENCY.

2. COMPOSITION/INFORMATION ON INGREDIENTS

Special Health Effects - Carcinogenicity
Not reviewed by NTP, IARC, or OSHA.

<table>
<thead>
<tr>
<th>CHEMICAL NAME</th>
<th>CAS #</th>
<th>RANGE %</th>
<th>EXPOSURE LIMITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Methyl Nadic Anhydride</td>
<td>25134-21-8</td>
<td>Trade secret</td>
<td>OSHA PEL - Not established</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>OSHA STEL - Not established</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>ACGIH TWA - Not established</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>ACGIH STEL - Not established</td>
</tr>
</tbody>
</table>

3. HAZARDS IDENTIFICATION


Primary Route(s) of Entry: Dermal

4. FIRST AID MEASURES

EYE
Flush eyes with water for at least 15 min. Get medical attention if irritation occurs.

SKIN CONTACT
Wipe away excess material with dry towel. Wash with mild soap and plenty of water. Get immediate medical attention.

INHALATION
Remove to fresh air. If breathing is difficult, get immediate medical attention.

or irritation occurs, get immediate medical attention.

INGESTION
Give 3-4 glasses of water. Do not induce vomiting. Get immediate medical attention.

OVEREXPOSURE EFFECTS
Warning! Corrosive. Causes skin and eye burns. May cause allergic skin reactions.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE
Allergy, eczema or skin conditions

5. FIRE-FIGHTING MEASURES

FLASH POINT
275°F (135°C)

EXTINGUISHING MEDIA
CO₂; water in copious amounts

SPECIAL FIREFIGHTING PROCEDURES
Use self-contained breathing apparatus

FIRE AND EXPLOSION HAZARDS
Combustion products may be toxic

6. ACCIDENTAL RELEASE MEASURES
7. HANDLING AND STORAGE

HANDLING/STORAGE
alkaline materials.

Store away from heat, oxidizing agents and corrosive. Causes skin and eye burns. Avoid breathing vapor, mist or spray. Store in cool, dry area in closed containers. Use only with adequate ventilation. Eye wash and safety shower should be available nearby when product is handled. For industrial use only.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

EYES
SKIN
INHALATION
organic vapors.
VENTILATION

Chemical goggles
Wear impervious rubber gloves.
Use NIOSH approved respirator suitable for
General mechanical ventilation and local

9. PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL FORM
APPEARANCE AND ODOR
SOLUBILITY IN WATER
SPECIFIC GRAVITY
BOILING POINT
DECOMPOSITION TEMPERATURE

Viscous liquid
Clear, light yellow
Reacts with water
~1.2g/cc
> 250°C (> 482°F)
> 200°C (> 392°F)

10. STABILITY AND REACTIVITY

STABILITY
INCOMPATIBILITIES
ions, alkaline materials
HAZARDOUS DECOMPOSITION PRODUCTS
HAZARDOUS POLYMERIZATION CONDITIONS TO AVOID metal ions.

Stable
Strong oxidizing agents, water, alkali metal
Carbon monoxide, carbon dioxide and aldehydes.
May occur above 200°C
High temperatures in the presence of alkali

11. TOXICOLOGICAL INFORMATION

ORAL LD₅₀
DERMAL LD₅₀
INHALATION LC₅₀
SKIN IRRITATION
EYE IRRITATION
SENSITIZATION

~ 640 mg/kg - rat
~ 4900 mg/kg - rat
~ 750 mg/cu.m/4h - rat
Corrosive
Corrosive
Sensitizer

12. ECOLOGICAL INFORMATION

Data not yet available

13. DISPOSAL CONSIDERATIONS

According to Federal, State, and Local regulations. This product is not considered to be a hazardous waste by RCRA.

14. TRANSPORT INFORMATION
PROPER SHIPPING NAME: Corrosive liquid, n.o.s. (Contains Methyl nadic anhydride)

ID NUMBER: UN 1760
LABEL REQUIRED: Corrosive
HAZARD CLASS: 8
PACKING GROUP: II

15. REGULATORY INFORMATION

OSHA STATUS: This MSDS has been prepared in compliance with Federal OSHA Hazard Communication Standard 29 CFR 1910.1200. This product is considered to be a hazardous chemical under that standard.

RCRA: Not a hazardous waste under RCRA (40 CFR 261), but handle with care due to corrosive effect on skin and eyes.

TSCA INVENTORY STATUS: Chemical components listed on TSCA Inventory

SARA/TITLE III: This product does not contain a toxic chemical under SEC. 313 (40 CFR 372)

CERLA: Not listed

CALIFORNIA PROPOSITION 65: This product does not contain any substance known to the State of California to cause cancer.

16. OTHER INFORMATION

FOR TECHNICAL INFORMATION CONTACT: DR. NASEEM A. MUNSHI
COORDINATOR OF PRODUCT SAFETY

COMPOSITE TECHNOLOGY DEVELOPMENT, INC
1505 COAL CREEK DRIVE
LAFLAYETTE, CO 80026
(303) 664-0394

ISSUE DATE: 01/05/99
REVISION DATE & NO.:

THE INFORMATION AND RECOMMENDATIONS CONTAINED HEREIN ARE BASED UPON DATA BELIEVED TO BE ACCURATE. HOWEVER, NO GUARANTEE OR WARRANTY OF ANY KIND EXPRESSED OR IMPLIED IS MADE WITH RESPECT TO THE INFORMATION CONTAINED HEREIN.
1. PRODUCT IDENTIFICATION

Trade Name and Synonyms
CTD-101K PART C

Chemical Name and/or Family or Description
Accelerator for curing epoxy resins

CHEMICAL IDENTIFICATION TRADE SECRET. COMPOSITION WILL BE REVEALED TO A HEALTH PROFESSIONAL IN THE CASE OF A MEDICAL EMERGENCY.

2. COMPOSITION/INFORMATION ON INGREDIENTS

Carcinogenicity: Not reviewed by OSHA, IARC or NTP

<table>
<thead>
<tr>
<th>CHEMICAL NAME</th>
<th>CAS #</th>
<th>RANGE %</th>
<th>EXPOSURE LIMITS</th>
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</thead>
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<tr>
<td>Dibutyl Phthalate</td>
<td>84-74-2</td>
<td>Trade secret</td>
<td>OSHA PEL - 5 mg/m³</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>ACGIH TWA - 5 mg/m³</td>
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<tr>
<td>Phenol</td>
<td>108-95-2</td>
<td>Trade secret</td>
<td>OSHA PEL - 5 ppm</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>ACGIH TWA - 5 ppm</td>
</tr>
</tbody>
</table>

3. HAZARDS IDENTIFICATION

Emergency Overview: Severely irritating to eyes, nose and throat. Prolonged overexposure may cause collapse and liver or kidney damage. May cause allergic skin reactions.

Primary Route(s) of Entry: Dermal

4. FIRST AID MEASURES

EYE
Flush eyes with water for at least 15 min. Get medical attention if irritation occurs.

SKIN CONTACT
Wipe away excess material with dry towel.
Wash with mild soap and plenty of water. Get immediate medical attention.

INHALATION
Remove to fresh air. If breathing is difficult, get immediate medical attention.

INGESTION
Give 3-4 glasses of water. Do not induce vomiting. Get immediate medical attention.

OVEREXPOSURE EFFECTS
Overexposure may produce weakness, headache, dizziness. Prolonged overexposure may cause collapse and liver or kidney damage.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE
Allergy, eczema or skin conditions

5. FIRE-FIGHTING MEASURES

FLASH POINT
180°F (82°C)

EXTINGUISHING MEDIA
CO₂ spray, dry chemical, foam

SPECIAL FIREFIGHTING PROCEDURES
Use self-contained breathing apparatus

FIRE AND EXPLOSION HAZARDS
Combustion products may be toxic

6. ACCIDENTAL RELEASE MEASURES
7. HANDLING AND STORAGE

HANDLING/STORAGE alkaline materials. Store away from heat, oxidizing agents and breathing vapor, mist or spray. Store in cool, dry area in closed containers. Use only with adequate ventilation. Eye wash and safety shower should be available nearby when product is handled. For industrial use only.

8. EXPOSURE CONTROLS/PRESSURE PROTECTION

EYES Chemical goggles
SKIN Wear impervious rubber gloves.
INHALATION Use NIOSH approved respirator suitable for organic vapors.
VENTILATION General mechanical ventilation and local exhaust.

9. PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL FORM Liquid
APPEARANCE AND ODOR Clear, amine odor
SOLUBILITY IN WATER Soluble
SPECIFIC GRAVITY ~1.0 g/cc
BOILING POINT > 150°C (> 302°F)
DECOMPOSITION TEMPERATURE > 200°C (> 392°F)

10. STABILITY AND REACTIVITY

STABILITY Stable
INCOMPATIBILITIES Strong oxidizing agents, strong acids, and strong alkaline materials
HAZARDOUS DECOMPOSITION PRODUCTS Carbon monoxide, carbon dioxide, aldehydes, and nitrogen oxides
HAZARDOUS POLYMERIZATION CONDITIONS TO AVOID Will not occur
High temperatures.

11. TOXICOLOGICAL INFORMATION

ORAL LD₅₀ 780 mg/kg - rat
DERMAL LD₅₀ 250 mg/kg - rabbit
INHALATION LC₅₀ > 1.06 mg/l air, 4h exposure - rat Mild - rabbit Severe Sensitizer

12. ECOLOGICAL INFORMATION

Data not yet available. This product contains a marine pollutant, dibutyl phthalate

13. DISPOSAL CONSIDERATIONS

According to Federal, State, and Local regulations.

14. TRANSPORT INFORMATION

PROPER SHIPPING NAME Environmentally hazardous substance, liquid, n.o.s.
(Contains Dibutyl Phthalate)

CTD-101K PART C
13/09/2017
15. REGULATORY INFORMATION

OSHA STATUS
Standard 29 CFR 1910.1200. This product is considered to be a hazardous chemical under that standard.

RCRA
Not a hazardous waste under RCRA (40 CFR 261)

TSCA INVENTORY STATUS
TSCA 12(b) EXPORT NOTIFICATION regulated by TSCA 12(b) Regulation and it is required that proper export notification shall be sent to

EPA prior to shipping out of the US.

SARA/TITLE III:

Dibutyl Phthalate, & 16.8%; 108-95-2, Phenol

CERCLA

CALIFORNIA PROPOSITION 65

This product contains a toxic chemical under SEC. 313 (40 CFR 372): 50%; 84-74-2;

RQ 20lb (Dibutyl Phthalate) (U069)

This product does not contain any substance known to the State of California to cause cancer.

16. OTHER INFORMATION

FOR TECHNICAL INFORMATION CONTACT: DR. NASEEM A. MUNSHI
COORDINATOR OF PRODUCT SAFETY

COMPOSITE TECHNOLOGY DEVELOPMENT, INC
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SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 **Product identifiers**
   - **Product name**: Sodium hydrosulfite
   - **Product Number**: 157953
   - **Brand**: Sigma-Aldrich
   - **Index-No.**: 016-028-00-1
   - **REACH No.**: A registration number is not available for this substance as the substance or its uses are exempted from registration, the annual tonnage does not require a registration or the registration is envisaged for a later registration deadline.
   - **CAS-No.**: 7775-14-6

1.2 **Relevant identified uses of the substance or mixture and uses advised against**
   - **Identified uses**: Laboratory chemicals, Manufacture of substances

1.3 **Details of the supplier of the safety data sheet**
   - **Company**: Sigma-Aldrich Chemie GmbH
     Riedstrasse 2
     D-89555 STEINHEIM
   - **Telephone**: +49 89-6513-1444
   - **Fax**: +49 7329-97-2319
   - **E-mail address**: eurtechserv@sigma.com

1.4 **Emergency telephone number**
   - **Emergency Phone #**: 0800 181 7059 (CHEMTREC Deutschland)
     +49 (0)696 43508409 (CHEMTREC weltweit)

SECTION 2: Hazards identification

2.1 **Classification of the substance or mixture**
   - **Classification according to Regulation (EC) No 1272/2008**
     - Self-heating substances and mixtures (Category 1), H251
     - Acute toxicity, Oral (Category 4), H302
   - For the full text of the H-Statements mentioned in this Section, see Section 16.

   - **Classification according to EU Directives 67/548/EEC or 1999/45/EC**
     - R 7
     - Xn  Harmful
     - R22
     - R31
   - For the full text of the R-phrases mentioned in this Section, see Section 16.

2.2 **Label elements**
   - **Labelling according Regulation (EC) No 1272/2008**
     - **Pictogram**: ![Flame with exclamation mark]
     - **Signal word**: Danger
Hazard statement(s)
H251 Self-heating: may catch fire.
H302 Harmful if swallowed.

Precautionary statement(s)
P235 + P410 Keep cool. Protect from sunlight.

Supplemental Hazard information (EU)
EUH031 Contact with acids liberates toxic gas.

2.3 Other hazards - none

SECTION 3: Composition/information on ingredients

3.1 Substances
Synonyms : Sodium dithionite
Sodium hypodisulfite

Formula : Na₂O₄S₂
Molecular Weight : 174.11 g/mol
CAS-No. : 7775-14-6
EC-No. : 231-890-0
Index-No. : 016-028-00-1

<table>
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<tr>
<th>Component</th>
<th>Classification</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sodium dithionite</td>
<td>Self-heat. 1; Acute Tox. 4; H251, H302, EUH031</td>
<td>&lt;= 100 %</td>
</tr>
</tbody>
</table>

Hazardous ingredients according to Directive 1999/45/EC

<table>
<thead>
<tr>
<th>Component</th>
<th>Classification</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sodium dithionite</td>
<td>Xn, R 7 - R22 - R31</td>
<td>&lt;= 100 %</td>
</tr>
</tbody>
</table>

For the full text of the H-Statements and R-Phrases mentioned in this Section, see Section 16

SECTION 4: First aid measures

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11
4.3 Indication of any immediate medical attention and special treatment needed
   no data available

SECTION 5: Firefighting measures

5.1 Extinguishing media
   Suitable extinguishing media
   Dry powder

5.2 Special hazards arising from the substance or mixture
   no data available

5.3 Advice for firefighters
   Wear self contained breathing apparatus for fire fighting if necessary.

5.4 Further information
   Addition of small amounts of water may cause self ignition.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
   Wear respiratory protection. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust.
   For personal protection see section 8.

6.2 Environmental precautions
   Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up
   Sweep up and shovel. Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations (see section 13). Do not flush with water. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
   For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling
   Avoid contact with skin and eyes. Avoid formation of dust and aerosols.
   Provide appropriate exhaust ventilation at places where dust is formed. Keep away from sources of ignition
   - No smoking.
   For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
   Store in cool place. Keep container tightly closed in a dry and well-ventilated place.
   Never allow product to get in contact with water during storage. Do not store near acids.

7.3 Specific end use(s)
   Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

SECTION 8: Exposure controls/personal protection

8.1 Control parameters
   Components with workplace control parameters

8.2 Exposure controls
   Appropriate engineering controls
   Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.
Personal protective equipment

**Eye/face protection**
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

**Skin protection**
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove’s outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

The selected protective gloves have to satisfy the specifications of EU Directive 89/686/EEC and the standard EN 374 derived from it.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0,11 mm
Break through time: > 480 min
Material tested:

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0,11 mm
Break through time: > 480 min
Material tested:

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

**Body Protection**
Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

**Respiratory protection**
Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

**Control of environmental exposure**
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
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<tbody>
<tr>
<td>a) Appearance</td>
<td>Form: powder</td>
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<tr>
<td>b) Odour</td>
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<tr>
<td>c) Odour Threshold</td>
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<td></td>
</tr>
<tr>
<td>d) pH</td>
<td>7.0 - 9 at 50 g/l at 20 °C</td>
<td></td>
</tr>
<tr>
<td>e) Melting point/freezing point</td>
<td>300 °C</td>
<td></td>
</tr>
<tr>
<td>f) Initial boiling point and boiling range</td>
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<td></td>
</tr>
</tbody>
</table>
9.2 Other safety information

SECTION 10: Stability and reactivity

10.1 Reactivity
no data available

10.2 Chemical stability
May decompose on exposure to air and moisture. Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
no data available

10.4 Conditions to avoid
Do not allow water to enter container because of violent reaction. Avoid moisture. Heat.

10.5 Incompatible materials
Strong oxidizing agents, acids, Water

10.6 Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Sulphur oxides, Sodium oxides
Other decomposition products - no data available
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
no data available

Skin corrosion/irritation
no data available

Serious eye damage/eye irritation
no data available
Respiratory or skin sensitisation
no data available

Germ cell mutagenicity
no data available

Carcinogenicity
IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

Reproductive toxicity
no data available

Specific target organ toxicity - single exposure
no data available

Specific target organ toxicity - repeated exposure
no data available

Aspiration hazard
no data available

Additional Information
RTECS: Not available
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

SECTION 12: Ecological information

12.1 Toxicity
Toxicity to fish LC50 - Leuciscus idus (Golden orfe) - 10 - 100 mg/l - 96 h
Toxicity to daphnia and other aquatic invertebrates EC50 - Daphnia magna (Water flea) - 10 - 100 mg/l - 48 h

12.2 Persistence and degradability
no data available

12.3 Bioaccumulative potential
no data available

12.4 Mobility in soil
no data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects
Toxic to aquatic life.
no data available

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product
Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Offer surplus and non-recyclable solutions to a licensed disposal company.

Contaminated packaging
Dispose of as unused product.
SECTION 14: Transport information

14.1 UN number
ADR/RID: 1384  IMDG: 1384  IATA: 1384

14.2 UN proper shipping name
ADR/RID: SODIUM DITHIONITE  IMDG: SODIUM DITHIONITE  IATA: Sodium dithionite

14.3 Transport hazard class(es)
ADR/RID: 4.2  IMDG: 4.2  IATA: 4.2

14.4 Packaging group
ADR/RID: II  IMDG: II  IATA: II

14.5 Environmental hazards
ADR/RID: no  IMDG Marine pollutant: no  IATA: no

14.6 Special precautions for user
no data available

SECTION 15: Regulatory information

This safety datasheet complies with the requirements of Regulation (EC) No. 1907/2006.

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture
no data available

15.2 Chemical Safety Assessment
For this product a chemical safety assessment was not carried out

SECTION 16: Other information

Full text of H-Statements referred to under sections 2 and 3.

Acute Tox.  Acute toxicity
EUH031  Contact with acids liberates toxic gas.
H251  Self-heating: may catch fire.
H302  Harmful if swallowed.
Self-heat.  Self-heating substances

Full text of R-phrases referred to under sections 2 and 3

Xn  Harmful
R 7  May cause fire.
R22  Harmful if swallowed.
R31  Contact with acids liberates toxic gas.

Further information
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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.
SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers

Product name: SODIUM DIBUTYLDITHIOCARBAMATE

Product Number: CDS010552
Brand: Aldrich
REACH No.: A registration number is not available for this substance as the substance or its uses are exempted from registration, the annual tonnage does not require a registration or the registration is envisaged for a later registration deadline.
CAS-No.: 136-30-1

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses: Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet

Company: Sigma-Aldrich Chemie GmbH
Riedstrasse 2
D-89555 STEINHEIM

Telephone: +49 89-6513-1444
Fax: +49 7329-97-2319
E-mail address: eurtechserv@siol.com

1.4 Emergency telephone number

Emergency Phone # 0800 181 7059 (CHEMTREK Deutschland)
+49 (0)696 43508409 (CHEMTREK weltweit)

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

Classification according to Regulation (EC) No 1272/2008
Acute toxicity, Dermal (Category 3), H311
Skin corrosion (Category 1B), H314
Skin sensitisation (Category 1), H317
Acute aquatic toxicity (Category 1), H400

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 Label elements

Labelling according Regulation (EC) No 1272/2008
Pictogram

Signal word: Danger
Hazard statement(s):
H311 Toxic in contact with skin.
H314 Causes severe skin burns and eye damage.
Precautionary statement(s)
P273 Avoid release to the environment.
P280 Wear protective gloves/ protective clothing/ eye protection/ face protection.
P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P310 Immediately call a POISON CENTER or doctor/ physician.

Supplemental Hazard Statements

2.3 **Other hazards** - none

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**SECTION 3: Composition/information on ingredients**

**3.1 Substances**

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<th>Molecular weight</th>
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<td>EC-No.</td>
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Hazardous ingredients according to Regulation (EC) No 1272/2008

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<tr>
<th>Component</th>
<th>Classification</th>
<th>Concentration</th>
</tr>
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<tr>
<td>sodium dibutylidithiocarbamate</td>
<td>Acute Tox. 4; Acute Tox. 3; Skin Corr. 1B; Skin Sens. 1; STOT RE 2; Aquatic Acute 1; H302, H311, H314, H317, H373, H400 M-Factor - Aquatic Acute: 1</td>
<td>&gt;= 50 - &lt;= 100 %</td>
</tr>
</tbody>
</table>

For the full text of the H-Statements mentioned in this Section, see Section 16.

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**SECTION 4: First aid measures**

4.1 **Description of first aid measures**

**General advice**
Consult a physician. Show this safety data sheet to the doctor in attendance.

**If inhaled**
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

**In case of skin contact**
Take off contaminated clothing and shoes immediately. Wash off with soap and plenty of water. Take victim immediately to hospital. Consult a physician.

**In case of eye contact**
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

**If swallowed**
Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 **Most important symptoms and effects, both acute and delayed**
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 **Indication of any immediate medical attention and special treatment needed**
No data available
SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
Carbon oxides, Nitrogen oxides (NOx), Sulphur oxides, Sodium oxides

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
No data available

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
Wear respiratory protection. Avoid breathing vapours, mist or gas. Ensure adequate ventilation.
Evacuate personnel to safe areas.
For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up
Soak up with inert absorbent material and dispose of as hazardous waste. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Store in cool place. Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Components with workplace control parameters

8.2 Exposure controls

Appropriate engineering controls
Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product.

Personal protective equipment

Eye/face protection
Tightly fitting safety goggles. Faceshield (8-inch minimum). Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).
**Skin protection**
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

The selected protective gloves have to satisfy the specifications of EU Directive 89/686/EEC and the standard EN 374 derived from it.

**Body Protection**
Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

**Respiratory protection**
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

**Control of environmental exposure**
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

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**SECTION 9: Physical and chemical properties**

**9.1 Information on basic physical and chemical properties**

a) Appearance Form: liquid
b) Odour No data available
c) Odour Threshold No data available
d) pH No data available
e) Melting point/freezing point No data available
f) Initial boiling point and boiling range No data available
g) Flash point No data available
h) Evaporation rate No data available
i) Flammability (solid, gas) No data available
j) Upper/lower flammability or explosive limits No data available
k) Vapour pressure No data available
l) Vapour density No data available
m) Relative density No data available
n) Water solubility No data available
o) Partition coefficient: n-octanol/water No data available
p) Auto-ignition temperature No data available
q) Decomposition temperature No data available
r) Viscosity No data available
s) Explosive properties No data available
t) Oxidizing properties  No data available

9.2 Other safety information
No data available

SECTION 10: Stability and reactivity

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
No data available

10.5 Incompatible materials
No data available

10.6 Hazardous decomposition products
Other decomposition products - No data available
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
No data available

Skin corrosion/irritation
No data available

Serious eye damage/eye irritation
No data available

Respiratory or skin sensitisation
No data available

Germ cell mutagenicity
No data available

Carcinogenicity
IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

Reproductive toxicity
No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

Additional Information
RTECS: EZ3880000

SECTION 12: Ecological information

12.1 Toxicity
No data available
12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects
Very toxic to aquatic life.

SECTION 13: Disposal considerations

13.1 Waste treatment methods
Product
Offer surplus and non-recyclable solutions to a licensed disposal company.

Contaminated packaging
Dispose of as unused product.

SECTION 14: Transport information

14.1 UN number
ADR/RID: 2922
IMDG: 2922
IATA: 2922

14.2 UN proper shipping name
ADR/RID: CORROSIVE LIQUID, TOXIC, N.O.S. (sodium dibutylidithiocarbamate)
IMDG: CORROSIVE LIQUID, TOXIC, N.O.S. (sodium dibutylidithiocarbamate)
IATA: Corrosive liquid, toxic, n.o.s. (sodium dibutylidithiocarbamate)

14.3 Transport hazard class(es)
ADR/RID: 8 (6.1)
IMDG: 8 (6.1)
IATA: 8 (6.1)

14.4 Packaging group
ADR/RID: III
IMDG: III
IATA: III

14.5 Environmental hazards
ADR/RID: yes
IMDG Marine pollutant: yes
IATA: no

14.6 Special precautions for user
No data available

SECTION 15: Regulatory information

This safety datasheet complies with the requirements of Regulation (EC) No. 453/2010.

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture

15.2 Chemical Safety Assessment
For this product a chemical safety assessment was not carried out

SECTION 16: Other information

Full text of H-Statements referred to under sections 2 and 3.

H302 Harmful if swallowed.
H311 Toxic in contact with skin.
H314 Causes severe skin burns and eye damage.
H317 May cause an allergic skin reaction.
H373 May cause damage to organs through prolonged or repeated exposure.
Further information
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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.
SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers
Product name: Sodium dodecyl sulfate

Product Number: L3771
Brand: Sigma
REACH No.: A registration number is not available for this substance as the substance or its uses are exempted from registration, the annual tonnage does not require a registration or the registration is envisaged for a later registration deadline.

CAS-No.: 151-21-3

1.2 Relevant identified uses of the substance or mixture and uses advised against
Identified uses: Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet
Company: Sigma-Aldrich Chemie GmbH
Riedstrasse 2
D-89555 STEINHEIM

Telephone: +49 89-6513-1444
Fax: +49 7329-97-2319
E-mail address: euretechserv@sial.com

1.4 Emergency telephone number
Emergency Phone #
0800 181 7059 (CHEMTREC Deutschland)
+49 (0)69 63508409 (CHEMTREC weltweit)

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture
Classification according to Regulation (EC) No 1272/2008
Flammable solids (Category 2), H228
Acute toxicity, Oral (Category 4), H302
Acute toxicity, Inhalation (Category 4), H332
Skin irritation (Category 2), H315
Serious eye damage (Category 1), H318
Specific target organ toxicity - single exposure (Category 3), Respiratory system, H335
Chronic aquatic toxicity (Category 3), H412

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 Label elements
Labelling according Regulation (EC) No 1272/2008
Pictogram

Signal word: Danger
Hazard statement(s)
H228 Flammable solid.
H302 + H332 Harmful if swallowed or if inhaled
H315 Causes skin irritation.
H318 Causes serious eye damage.
H335 May cause respiratory irritation.
H412 Harmful to aquatic life with long lasting effects.

Precautionary statement(s)
P210 Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
P261 Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray.
P280 Wear eye protection/ face protection.
P301 + P312 + P330 IF SWALLOWED: Call a POISON CENTER/doctor if you feel unwell. Rinse mouth.
P305 + P351 + P338 + P310 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a POISON CENTER/doctor.
P370 + P378 In case of fire: Use dry powder or dry sand to extinguish.

Supplemental Hazard Statements

2.3 Other hazards
This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher. Possible sensitizer.

SECTION 3: Composition/information on ingredients

3.1 Substances
Synonyms :
- Lauryl sulfate sodium salt
- Sodium dodecyl sulphate
- Sodium dodecyl sulfate
- Sodium lauryl sulfate
- Dodecyl sodium sulfate
- Dodecyl sulphate sodium salt
- SDS

Formula : C_{12}H_{25}NaO_{4}S
Molecular weight : 288.38 g/mol
CAS-No. : 151-21-3
EC-No. : 205-788-1

Hazardous ingredients according to Regulation (EC) No 1272/2008

<table>
<thead>
<tr>
<th>Component</th>
<th>Classification</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sodium dodecyl sulphate</td>
<td>Flam. Sol. 2; Acute Tox. 4; Skin Irrit. 2; Eye Dam. 1; STOT SE 3; Aquatic Chronic 3; H228, H302, H332, H315, H318, H335, H412</td>
<td>&lt;= 100 %</td>
</tr>
<tr>
<td>CAS-No.</td>
<td>151-21-3</td>
<td></td>
</tr>
<tr>
<td>EC-No.</td>
<td>205-788-1</td>
<td></td>
</tr>
</tbody>
</table>

Concentration limits: 10 - < 20 %: Eye Irrit. 2, H319; >= 20 %: Eye Dam. 1, H318;

For the full text of the H-Statements mentioned in this Section, see Section 16.
SECTION 4: First aid measures

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If swallowed
Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11.

4.3 Indication of any immediate medical attention and special treatment needed
No data available

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
No data available

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
Use water spray to cool unopened containers.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
Use personal protective equipment. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Avoid breathing dust.
For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up
Sweep up and shovel. Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations (see section 13). Keep in suitable, closed containers for disposal. Contain spillage, pick up with an electrically protected vacuum cleaner or by wet-brushing and transfer to a container for disposal according to local regulations (see section 13).

6.4 Reference to other sections
For disposal see section 13.
SECTION 7: Handling and storage

7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid formation of dust and aerosols.
Provide appropriate exhaust ventilation at places where dust is formed. Keep away from sources of ignition.
- No smoking.
Take measures to prevent the build up of electrostatic charge.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Store in cool place. Keep container tightly closed in a dry and well-ventilated place.

hygroscopic
Storage class (TRGS 510): Flammable solid hazardous materials

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Components with workplace control parameters

8.2 Exposure controls

Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove’s outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

The selected protective gloves have to satisfy the specifications of EU Directive 89/686/EEC and the standard EN 374 derived from it.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de,
test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.
**Body Protection**
Complete suit protecting against chemicals, Flame retardant antistatic protective clothing. The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

**Respiratory protection**
Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

**Control of environmental exposure**
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

---

**SECTION 9: Physical and chemical properties**

**9.1 Information on basic physical and chemical properties**

<table>
<thead>
<tr>
<th>a) Appearance</th>
<th>Form: Rods</th>
</tr>
</thead>
<tbody>
<tr>
<td>b) Odour</td>
<td>odourless</td>
</tr>
<tr>
<td>c) Odour Threshold</td>
<td>No data available</td>
</tr>
<tr>
<td>d) pH</td>
<td>9.1 at 10 g/l</td>
</tr>
<tr>
<td>e) Melting point/freezing point</td>
<td>Melting point/range: 204 - 207 °C - lit.</td>
</tr>
<tr>
<td>f) Initial boiling point and boiling range</td>
<td>No data available</td>
</tr>
<tr>
<td>g) Flash point</td>
<td>170 °C</td>
</tr>
<tr>
<td>h) Evaporation rate</td>
<td>No data available</td>
</tr>
<tr>
<td>i) Flammability (solid, gas)</td>
<td>The substance or mixture is a flammable solid with the category 2.</td>
</tr>
<tr>
<td>j) Upper/lower flammability or explosive limits</td>
<td>No data available</td>
</tr>
<tr>
<td>k) Vapour pressure</td>
<td>0.0018 hPa at 20 °C</td>
</tr>
<tr>
<td>l) Vapour density</td>
<td>No data available</td>
</tr>
<tr>
<td>m) Relative density</td>
<td>0.370 g/cm³</td>
</tr>
<tr>
<td>n) Water solubility</td>
<td>soluble</td>
</tr>
<tr>
<td>o) Partition coefficient: n-octanol/water</td>
<td>log Pow: 0.83 at 22 °C</td>
</tr>
<tr>
<td>p) Auto-ignition temperature</td>
<td>310.5 °C</td>
</tr>
<tr>
<td>q) Decomposition temperature</td>
<td>No data available</td>
</tr>
<tr>
<td>r) Viscosity</td>
<td>No data available</td>
</tr>
<tr>
<td>s) Explosive properties</td>
<td>No data available</td>
</tr>
<tr>
<td>t) Oxidizing properties</td>
<td>No data available</td>
</tr>
</tbody>
</table>

**9.2 Other safety information**

| Solubility in other solvents | Ethanol - partly soluble |
SECTION 10: Stability and reactivity

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
Heat, flames and sparks.

10.5 Incompatible materials
Oxidizing agents

10.6 Hazardous decomposition products
Other decomposition products - No data available
Hazardous decomposition products formed under fire conditions. - Carbon oxides, Sulphur oxides, Sodium oxides
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - male and female - 1.200 mg/kg
LC50 Inhalation - Rat - 1 h - > 3.900 mg/m3

Skin corrosion/irritation
Skin - Rabbit
Result: Skin irritation - 24 h
(OECD Test Guideline 404)

Serious eye damage/eye irritation
Eyes - Rabbit
Result: Risk of serious damage to eyes.
(OECD Test Guideline 405)

Respiratory or skin sensitisation
Information given is based on data obtained from similar substances.

Germ cell mutagenicity
No data available
Ames test
S. typhimurium
Result: negative

Carcinogenicity
IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

Reproductive toxicity
No data available

Specific target organ toxicity - single exposure
No data available

Surface tension 25,2 mN/m at 23 °C
Dissociation constant 1,31 at 20 °C
Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

Additional Information
RTECS: WT1050000
sneezing, The sodium salt of dodecyl sulfate has been reported to cause pulmonary sensitization resulting in hyperactive airway dysfunction and pulmonary allergy accompanied by fatigue, malaise, and aching. Significant symptoms of exposure can persist for more than two years and can be activated by a variety of nonspecific environmental stimuli such as automobile exhaust, perfumes, and passive smoking. To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

SECTION 12: Ecological information

12.1 Toxicity
Toxicity to fish flow-through test LC50 - Pimephales promelas (fathead minnow) - 29 mg/l - 96 h
(OECD Test Guideline 203)
Toxicity to daphnia and other aquatic invertebrates LC50 - Daphnia dubia (water flea) - 5,55 mg/l - 48 h
NOEC - Daphnia dubia (water flea) - 0,684 mg/l - 7 d
Toxicity to algae Growth inhibition LOEC - Pseudokirchneriella subcapitata - 2,68 mg/l - 6 d
static test EC50 - Desmodesmus subspicatus (Scenedesmus subspicatus) - > 120 mg/l - 72 h

12.2 Persistence and degradability
Biodegradability aerobic - Exposure time 28 d
Result: 95 % - Readily biodegradable
(OECD Test Guideline 301B)
Ratio BOD/ThBOD 95,9 %

12.3 Bioaccumulative potential
Bioaccumulation Cyprinus carpio (Carp) - 72 h
Bioconcentration factor (BCF): 3,9 - 5,3

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

12.6 Other adverse effects
Toxic to aquatic life.

SECTION 13: Disposal considerations

13.1 Waste treatment methods
Product
Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Offer surplus and non-recyclable solutions to a licensed disposal company.
Contaminated packaging
Dispose of as unused product.

SECTION 14: Transport information

14.1 UN number
ADR/RID: 1325
IMDG: 1325
IATA: 1325

14.2 UN proper shipping name
ADR/RID: FLAMMABLE SOLID, ORGANIC, N.O.S. (Sodium dodecyl sulphate)
IMDG: FLAMMABLE SOLID, ORGANIC, N.O.S. (Sodium dodecyl sulphate)
IATA: Flammable solid, organic, n.o.s. (Sodium dodecyl sulphate)

14.3 Transport hazard class(es)
ADR/RID: 4.1
IMDG: 4.1
IATA: 4.1

14.4 Packaging group
ADR/RID: III
IMDG: III
IATA: III

14.5 Environmental hazards
ADR/RID: no
IMDG Marine pollutant: no
IATA: no

14.6 Special precautions for user
No data available

SECTION 15: Regulatory information

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture
This safety datasheet complies with the requirements of Regulation (EC) No. 1907/2006.

15.2 Chemical safety assessment
For this product a chemical safety assessment was not carried out

SECTION 16: Other information

Full text of H-Statements referred to under sections 2 and 3.

H228 Flammable solid.
H302 Harmful if swallowed.
H302 + H332 Harmful if swallowed or if inhaled
H315 Causes skin irritation.
H318 Causes serious eye damage.
H319 Causes serious eye irritation.
H332 Harmful if inhaled.
H335 May cause respiratory irritation.
H412 Harmful to aquatic life with long lasting effects.

Further information
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Material Safety Data Sheet
Diphenylamine MSDS

Section 1: Chemical Product and Company Identification

Product Name: Diphenylamine
Catalog Codes: SLD2347
CAS#: 122-39-4
RTECS: JJ7800000
TSCA: TSCA 8(b) inventory: Diphenylamine
Ci#: Not available.
Synonym: DFA, Deccoscald 282, Naugalube 428 L, Scaldip, Shield DPA; Aniline, N-Phenyl-; Anilinobenzene; Benzenamine, N-phenyl-; Benzene, anilino-; N,N-Diphenylamine; N-Phenylaniline; N-Phenylbenzenamine
Chemical Name: Diphenylamine
Chemical Formula: C12-H11-N
Contact Information:
Scienclab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396
US Sales: 1-800-901-7247
International Sales: 1-281-441-4400
Order Online: ScienceLab.com
CHEMTREC (24HR Emergency Telephone), call:
1-800-424-9300
International CHEMTREC, call: 1-703-527-3887
For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

<table>
<thead>
<tr>
<th>Name</th>
<th>CAS #</th>
<th>% by Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diphenylamine</td>
<td>122-39-4</td>
<td>100</td>
</tr>
</tbody>
</table>

Toxicological Data on Ingredients: Diphenylamine: ORAL (LD50): Acute: 1120 mg/kg [Rat]. 1230 mg/kg [Mouse]. 300 mg/kg [Guinea pig].

Section 3: Hazards Identification

Potential Acute Health Effects:
Hazardous in case of skin contact (irritant, permeator), of eye contact (irritant), of ingestion, of inhalation. Severe over-exposure can result in death.

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: Not available. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance may be toxic to blood, kidneys, liver, bladder. Repeated or prolonged exposure to the substance can produce target organs damage. Repeated exposure to a highly toxic material may produce general deterioration of health by an accumulation in one or many human organs.

Section 4: First Aid Measures
Eye Contact:
Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention.

Skin Contact:
In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Cover the irritated skin with an emollient. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention immediately.

Serious Skin Contact:
Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek immediate medical attention.

Inhalation:
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention immediately.

Serious Inhalation: Not available.

Ingestion:
If swallowed, do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention immediately.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammanbility of the Product: May be combustible at high temperature.

Auto-Ignition Temperature: 634°C (1173.2°F)

Flash Points:
CLOSED CUP: 153°C (307.4°F).

Flammable Limits: Not available.

Products of Combustion: These products are carbon oxides (CO, CO2).

Fire Hazards in Presence of Various Substances:
Slightly flammable to flammable in presence of open flames and sparks, of heat. Non-flammable in presence of shocks.

Explosion Hazards in Presence of Various Substances:
Slightly explosive in presence of open flames and sparks. Non-explosive in presence of shocks.

Fire Fighting Media and Instructions:
SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use water spray, fog or foam. Do not use water jet.

Special Remarks on Fire Hazards:
When heated to decomposition it emits highly toxic fumes of Nitrogen oxides As with most organic solids, fire is possible at elevated temperatures

Special Remarks on Explosion Hazards:
Fine dust dispersed in air in sufficient concentrations, and in the presences of an ignition source is a potential dust explosion hazard.

Section 6: Accidental Release Measures

Small Spill:
Use appropriate tools to put the spilled solid in a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and dispose of according to local and regional authority requirements.

Large Spill:
Poisonous solid. Stop leak if without risk. Do not get water inside container. Do not touch spilled material. Use water spray to reduce vapors. Prevent entry into sewers, basements or confined areas; dike if needed. Eliminate all ignition sources. Call for
assistance on disposal. Finish cleaning by spreading water on the contaminated surface and allow to evacuate through the sanitary system. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:
Keep locked up. Keep away from heat. Keep away from sources of ignition. Empty containers pose a fire risk, evaporate the residue under a fume hood. Ground all equipment containing material. Do not ingest. Do not breathe dust. Wear suitable protective clothing. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes. Keep away from incompatibles such as oxidizing agents.

Storage: Keep container tightly closed. Keep container in a cool, well-ventilated area.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

Personal Protection:
Splash goggles. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Dust respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:
TWA: 10 (mg/m3) from ACGIH (TLV) [United States] TWA: 10 (mg/m3) from OSHA (PEL) [United States] TWA: 10 (mg/m3) from NIOSH [United States] TWA: 10 STEL: 20 (mg/m3) [United Kingdom (UK)] Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Solid. (Crystals solid.)
Odor: Floral.
Taste: Not available.
Molecular Weight: 169.23 g/mole
Color:

pH (1% soln/water): Not applicable.
Boiling Point: 302°C (575.6°F)
Melting Point: 53°C (127.4°F) - 54 C
Critical Temperature: Not available.
Specific Gravity: Density: 1.16 (Water = 1)
Vapor Pressure: 1 mmHg at 108 C
Vapor Density: 5.82 (Air = 1)
**Section 10: Stability and Reactivity Data**

**Stability:** The product is stable.

**Instability Temperature:** Not available.

**Conditions of Instability:** Excess heat, ignition sources, incompatible materials, light, air.

**Incompatibility with various substances:** Reactive with oxidizing agents.

**Corrosivity:** Non-corrosive in presence of glass.

**Special Remarks on Reactivity:** Incompatible with hexachloromelamine, and trichloromelamine. Air and light sensitive. Discolors in light. Crystals turn blue in air. Protect from light.

**Special Remarks on Corrosivity:** Not available.

**Polymerization:** Will not occur.

**Section 11: Toxicological Information**

**Routes of Entry:** Absorbed through skin. Dermal contact. Inhalation. Ingestion.

**Toxicity to Animals:** Acute oral toxicity (LD50): 300 mg/kg [Guinea pig].

**Chronic Effects on Humans:** May cause damage to the following organs: blood, kidneys, liver, bladder.

**Other Toxic Effects on Humans:** Hazardous in case of skin contact (irritant, permeator), of ingestion, of inhalation.

**Special Remarks on Toxicity to Animals:** Not available.

**Special Remarks on Chronic Effects on Humans:** May cause birth defects (teratogenic) based on animal test data

**Special Remarks on other Toxic Effects on Humans:**
Acute Potential Health Effects: Skin: Causes skin irritation. It is absorbed through intact skin. Eyes: Causes eye irritation. Inhalation: May cause respiratory tract irritation with coughing and sneezing. It is absorbed through the respiratory tract and may cause effects similar to those of acute ingestion. Ingestion: May cause digestive tract irritation. It is readily absorbed orally. It may affect behavior/central nervous system (somnolence), respiration (respiratory depression, dyspnea, cyanosis), blood (methemoglobinemia, anemia). Chronic Potential Health Effects: Ingestion: Prolonged or repeated ingestion may affect urinary system (bladder, kidneys - renal failure, acute tubular necrosis, Hematuria, Proteinuria), metabolism (weight loss, anorexia), liver, cardiovascular system (tachycardia, hypertension), spleen. Skin: Prolonged or repeated skin contact may cause dermatitis, an allergic skin reaction.

**Section 12: Ecological Information**

**Ecotoxicity:** Not available.
**Section 13: Disposal Considerations**

**Waste Disposal:**
Waste must be disposed of in accordance with federal, state and local environmental control regulations.

**Section 14: Transport Information**

**DOT Classification:**
Not a DOT controlled material (United States).

**Identification:**
Not applicable.

**Special Provisions for Transport:**
Not applicable.

**Section 15: Other Regulatory Information**

**Federal and State Regulations:**
Illinois toxic substances disclosure to employee act: Diphenylamine Rhode Island RTK hazardous substances: Diphenylamine Pennsylvania RTK: Diphenylamine Massachusetts RTK: Diphenylamine Massachusetts spill list: Diphenylamine New Jersey: Diphenylamine New Jersey spill list: Diphenylamine California Director's list of Hazardous Substances: Diphenylamine TSCA 8(b) inventory: Diphenylamine TSCA 4(a) proposed test rules: Diphenylamine TSCA 8(a) PAIR: Diphenylamine TSCA 8(d) H and S data reporting: Diphenylamine: Effective date: 3/11/94; Sunset date: 6/30/98 SARA 313 toxic chemical notification and release reporting: Diphenylamine CERCLA: Hazardous substances.: Diphenylamine

**Other Regulations:**

**Other Classifications:**

**WHMIS (Canada):** Not controlled under WHMIS (Canada).

**DSCL (EEC):**
R23/24/25- Toxic by inhalation, in contact with skin and if swallowed. R33- Danger of cumulative effects. R50/53- Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment. S28- After contact with skin, wash immediately with plenty of [***] S36/37- Wear suitable protective clothing and gloves. S45- In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible). S60- This material and its container must be disposed of as hazardous waste. S61- Avoid release to the environment. Refer to special instructions/Safety data sheets.

**HMIS (U.S.A.):**
- **Health Hazard:** 2
- **Fire Hazard:** 1
- **Reactivity:** 0
- **Personal Protection:** E

**National Fire Protection Association (U.S.A.):**
- **Health:** 3
- **Flammability:** 1
Reactivity: 0
Specific hazard:

Protective Equipment:
Gloves. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Splash goggles.

Section 16: Other Information

References: Not available.
Other Special Considerations: Not available.
Created: 10/10/2005 08:18 PM
Last Updated: 05/21/2013 12:00 PM

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall ScienceLab.com be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if ScienceLab.com has been advised of the possibility of such damages.
SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers
   Product name : Sodium sulfite

   Product Number : S0505
   Brand : Sigma-Aldrich
   REACH No. : A registration number is not available for this substance as the substance or its uses are exempted from registration, the annual tonnage does not require a registration or the registration is envisaged for a later registration deadline.
   CAS-No. : 7757-83-7

1.2 Relevant identified uses of the substance or mixture and uses advised against
   Identified uses : Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet
   Company : Sigma-Aldrich Chemie GmbH
             Riedstrasse 2
             D-89555 STEINHEIM
   Telephone : +49 89-6513-1444
   Fax : +49 7329-97-2319
   E-mail address : eurtechserv@sidal.com

1.4 Emergency telephone number
   Emergency Phone # : 0800 181 7059 (CHEMTREC Deutschland)
                    +49 (0)696 43508409 (CHEMTREC weltweit)

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture
   Not a hazardous substance or mixture according to Regulation (EC) No. 1272/2008.

   Classification according to EU Directives 67/548/EEC or 1999/45/EC
   R31

   For the full text of the R-phrases mentioned in this Section, see Section 16.

2.2 Label elements
   Labelling according Regulation (EC) No 1272/2008
   Pictogram : none
   Signal word : none
   Hazard statement(s) : none
   Precautionary statement(s) : none
   Supplemental Hazard information (EU)
   EUH031 : Contact with acids liberates toxic gas.

2.3 Other hazards
   This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.
SECTION 3: Composition/information on ingredients

3.1 Substances

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Formula</td>
<td>Na₂O₃S</td>
</tr>
<tr>
<td>Molecular weight</td>
<td>126.04 g/mol</td>
</tr>
<tr>
<td>CAS-No.</td>
<td>7757-83-7</td>
</tr>
<tr>
<td>EC-No.</td>
<td>231-821-4</td>
</tr>
</tbody>
</table>

No components need to be disclosed according to the applicable regulations.

SECTION 4: First aid measures

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
Dry powder

5.2 Special hazards arising from the substance or mixture
Sulphur oxides, Sodium oxides

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
No data available

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
Wear respiratory protection. Avoid dust formation. Avoid breathing vapours, mist or gas. Avoid breathing dust.
For personal protection see section 8.

6.2 Environmental precautions
Do not let product enter drains.

6.3 Methods and materials for containment and cleaning up
Pick up and arrange disposal without creating dust. Sweep up and shovel. Do not flush with water. Keep in suitable, closed containers for disposal.
6.4 Reference to other sections
For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling
Provide appropriate exhaust ventilation at places where dust is formed.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Store in cool place. Keep container tightly closed in a dry and well-ventilated place.
Never allow product to get in contact with water during storage. Do not store near acids.
Air and moisture sensitive.
Storage class (TRGS 510): Non Combustible Solids

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Components with workplace control parameters

8.2 Exposure controls

Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection
Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove’s outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

The selected protective gloves have to satisfy the specifications of EU Directive 89/686/EEC and the standard EN 374 derived from it.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0,11 mm
Break through time: 480 min
Material tested:Dermatri® (KCL 740 / Aldrich Z677272, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0,11 mm
Break through time: 480 min
Material tested:Dermatri® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de,
test method: EN374

If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.
Body Protection
Choose body protection in relation to its type, to the concentration and amount of dangerous substances, and to the specific work-place. The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Do not let product enter drains.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a) Appearance
Form: solid

b) Odour
No data available

c) Odour Threshold
No data available

d) pH
9.0 - 10.5 at 126 g/l at 25 °C

e) Melting point/freezing point
Decomposes before melting.

f) Initial boiling point and boiling range
Not applicable

g) Flash point
No data available

h) Evaporation rate
No data available

i) Flammability (solid, gas)
The product is not flammable.

j) Upper/lower flammability or explosive limits
No data available

k) Vapour pressure
No data available

l) Vapour density
No data available

m) Relative density
2,630 g/cm3

n) Water solubility
126 g/l at 20 °C - completely soluble

o) Partition coefficient: n-octanol/water
No data available

p) Auto-ignition temperature
does not ignite

q) Decomposition temperature
No data available

r) Viscosity
No data available

s) Explosive properties
Not explosive

t) Oxidizing properties
The substance or mixture is not classified as oxidizing.

9.2 Other safety information
No data available
SECTION 10: Stability and reactivity

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
Exposure to air may affect product quality. Exposure to moisture may affect product quality.

10.5 Incompatible materials
Acids, Strong oxidizing agents

10.6 Hazardous decomposition products
Other decomposition products - No data available
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - 3.560 mg/kg
LC50 Inhalation - Rat - 4 h - > 5.500 mg/m3
LD50 Dermal - Rat - > 2.000 mg/kg
(OECD Test Guideline 402)

Skin corrosion/irritation
Skin - Rabbit
Result: No skin irritation
(OECD Test Guideline 404)

Serious eye damage/eye irritation
Eyes - Rabbit
Result: Mild eye irritation
(OECD Test Guideline 405)

Respiratory or skin sensitisation
Prolonged or repeated exposure may cause allergic reactions in certain sensitive individuals.
in vivo assay - Mouse
Result: Did not cause sensitisation on laboratory animals.

Germ cell mutagenicity
No data available

Carcinogenicity
This product is or contains a component that is not classifiable as to its carcinogenicity based on its IARC, ACGIH, NTP, or EPA classification.

IARC: 3 - Group 3: Not classifiable as to its carcinogenicity to humans (Sodium sulphite)

Reproductive toxicity
No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available
Aspiration hazard
No data available

Additional Information
RTECS: WE2150000

May cause irritation of the; Gastrointestinal tract, violent colic, Diarrhoea, Disturbance of; circulatory system, Central nervous system depression, death. Persons with allergies and/or asthma may exhibit hypersensitivity to sulfites., To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.
Liver - Irregularities - Based on Human Evidence

SECTION 12: Ecological information

12.1 Toxicity
Toxicity to fish
LC50 - Gambusia affinis (Mosquito fish) - 660 mg/l - 96 h

12.2 Persistence and degradability
The methods for determining biodegradability are not applicable to inorganic substances.

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

12.6 Other adverse effects
No data available

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product
Offer surplus and non-recyclable solutions to a licensed disposal company. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Contaminated packaging
Dispose of as unused product.

SECTION 14: Transport information

14.1 UN number
ADR/RID: - IMDG: - IATA: -

14.2 UN proper shipping name
ADR/RID: Not dangerous goods IMDG: Not dangerous goods IATA: Not dangerous goods

14.3 Transport hazard class(es)
ADR/RID: - IMDG: - IATA: -

14.4 Packaging group
ADR/RID: - IMDG: - IATA: -

14.5 Environmental hazards
ADR/RID: no IMDG Marine pollutant: no IATA: no

14.6 Special precautions for user
No data available
SECTION 15: Regulatory information

This safety datasheet complies with the requirements of Regulation (EC) No. 1907/2006.

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture

No data available

15.2 Chemical Safety Assessment

For this product a chemical safety assessment was not carried out

SECTION 16: Other information

Full text of R-phrases referred to under sections 2 and 3

R31 Contact with acids liberates toxic gas.

Further information

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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.
Section 1 - Chemical Product and Company Identification

MSDS Name: Sodium polyphosphate
Catalog Numbers: AC390930000
Synonyms: Graham's salt; Sodium metaphosphate; Calgon.

Company Identification: Acros Organics BVBA
Janssen Pharmaceuticalsan 3a
2440 Geel, Belgium

Company Identification: (USA)
Acros Organics
One Reagent Lane
Fair Lawn, NJ 07410

For information in the US, call: 800-ACROS-01
For information in Europe, call: +32 14 57 52 11
Emergency Number, Europe: +32 14 57 52 99
Emergency Number US: 201-796-7100
CHEMTREC Phone Number, US: 800-424-9300
CHEMTREC Phone Number, Europe: 703-527-3887

Section 2 - Composition, Information on Ingredients

CAS#: 50813-16-6
Chemical Name: Sodium polyphosphate
%: 97-100
EINECS#: 256-779-4

Hazard Symbols: XI

Risk Phrases: 36/37/38

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Warning! Hygroscopic (absorbs moisture from the air). Causes eye, skin, and respiratory tract irritation. Target Organs: Respiratory system, eyes, skin.

Potential Health Effects
Eye: Causes eye irritation.
Skin: Causes skin irritation. May be harmful if absorbed through the skin.
Ingestion: May cause irritation of the digestive tract. May be harmful if swallowed.
Inhalation: Causes respiratory tract irritation. May be harmful if inhaled.
Chronic: No information found.

Section 4 - First Aid Measures

Eyes: Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid.
Skin: Get medical aid. Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes.

Ingestion: Get medical aid. Do NOT induce vomiting. If conscious and alert, rinse mouth and drink 2-4 cupfuls of milk or water.

Inhalation: Remove from exposure and move to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid.

Notes to Physician: Treat symptomatically and supportively.

Section 5 - Fire Fighting Measures

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear.

Extinguishing Media: Use water spray, dry chemical, carbon dioxide, or chemical foam.

Autoignition Temperature: Not available
Flash Point: Not available
Explosion Limits: Not available

NFPA Rating: health: 2; flammability: 1; instability: 1;

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.

Spills/Leaks: Vacuum or sweep up material and place into a suitable disposal container. Avoid generating dusty conditions. Provide ventilation. Do not let this chemical enter the environment.

Section 7 - Handling and Storage

Handling: Use with adequate ventilation. Minimize dust generation and accumulation. Avoid contact with eyes, skin, and clothing. Avoid ingestion and inhalation.

Storage: Store in a cool, dry place. Store in a tightly closed container.

Section 8 - Exposure Controls, Personal Protection

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>ACGIH</th>
<th>NIOSH</th>
<th>OSHA – Final PELs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sodium polyphosphate</td>
<td>none listed</td>
<td>none listed</td>
<td>none listed</td>
</tr>
</tbody>
</table>

OSHA Vacated PELs: Sodium polyphosphate: None listed

Engineering Controls:
Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate ventilation to keep airborne concentrations low.

Exposure Limits
Personal Protective Equipment

Eyes: Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

Skin: Wear appropriate protective gloves to prevent skin exposure.

Clothing: Wear appropriate protective clothing to prevent skin exposure.

Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a Respirators: NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

Section 9 - Physical and Chemical Properties

Physical State: Solid
Color: white
Odor: Not available
pH: Not available
Vapor Pressure: Not available
Vapor Density: Not available
Evaporation Rate: Not available
Viscosity: Not available
Boiling Point: Not available
Freezing/Melting Point: 600 deg C (1,112.00°F)
Decomposition Temperature: Not available
Solubility in water: 1000g/l (20°C)
Specific Gravity/Density:

Molecular Formula: (NaPO₃)n
Molecular Weight:

Section 10 - Stability and Reactivity
Chemical Stability:
Hygroscopic: absorbs moisture or water from the air.
Conditions to Avoid:
Incompatible materials, dust generation, exposure to moist air or water.
Incompatibilities with Other Materials: Not available
Hazardous Decomposition Products:
Oxides of phosphorus, toxic fumes of sodium oxide.
Hazardous Polymerization:
Has not been reported.

Section 11 - Toxicological Information
RTECS#: CAS# 50813-16-6: None listed
LD50/LC50: RTECS: Not available.
Carcinogenicity: Sodium polyphosphate - Not listed as a carcinogen by ACGIH, IARC, NTP, or CA Prop 65.
Other: The toxicological properties have not been fully investigated.

Section 12 - Ecological Information
Other: No information available.

Section 13 - Disposal Considerations
Dispose of in a manner consistent with federal, state, and local regulations.

Section 14 - Transport Information
US DOT
Shipping Name: Not Regulated.
Hazard Class:
UN Number:
Packing Group:
Canada TDG
Shipping Name: Not available
Hazard Class:
UN Number:
Packing Group:

Section 15 - Regulatory Information
European/International Regulations
European Labeling in Accordance with EC Directives
Hazard Symbols: XI
Risk Phrases:
R 36/37/38 Irritating to eyes, respiratory system and skin.
Safety Phrases:
S 26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
S 37/39 Wear suitable gloves and eye/face protection.
WGK (Water Danger/Protection)

CAS# 50813-16-6: 1

Canada

Canadian WHMIS Classifications: D2B

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

CAS# 50813-16-6 is not listed on Canada's Ingredient Disclosure List.

US Federal

TSCA

CAS# 50813-16-6 is not listed on the TSCA Inventory. It is for research and development use only.

Section 16 - Other Information

MSDS Creation Date: 12/15/2006
Revision #2 Date 7/20/2009

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantibility or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall the company be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential, or exemplary damages howsoever arising, even if the company has been advised of the possibility of such damages.

-----------------------------------------------------------------------------------------------------------------------------------
SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers
   Product name: Ethanol

   Product Number: 32205
   Brand: Sigma-Aldrich
   Index-No.: 603-002-00-5
   REACH No.: 01-2119457610-43-XXXX
   CAS-No.: 64-17-5

1.2 Relevant identified uses of the substance or mixture and uses advised against
   Identified uses: Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet
   Company: Sigma-Aldrich Chemie GmbH
   Riedstrasse 2
   D-89555 STEINHEIM
   Telephone: +49 89-6513-1444
   Fax: +49 7329-97-2319
   E-mail address: eurtechserv@sial.com

1.4 Emergency telephone number
   Emergency Phone # 0800 181 7059 (CHEMTREC Deutschland)
   +49 (0)696 43508409 (CHEMTREC weltweit)

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture
   Classification according to Regulation (EC) No 1272/2008
   Flammable liquids (Category 2), H225
   Eye irritation (Category 2), H319
   For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 Label elements
   Labelling according Regulation (EC) No 1272/2008
   Pictogram
   Signal word: Danger
   Hazard statement(s)
   H225: Highly flammable liquid and vapour.
   H319: Causes serious eye irritation.
   Precautionary statement(s)
   P210: Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
2.3 Other hazards
This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

SECTION 3: Composition/information on ingredients

3.1 Substances
Synonyms : Ethyl alcohol

Formula : C₂H₅O
Molecular weight : 46.07 g/mol
CAS-No. : 64-17-5
EC-No. : 200-578-6
Index-No. : 603-002-00-5
Registration number : 01-2119457610-43-XXXX

Hazardous ingredients according to Regulation (EC) No 1272/2008

<table>
<thead>
<tr>
<th>Component</th>
<th>Classification</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethanol</td>
<td>Flam. Liq. 2; Eye Irrit. 2; H225, H319</td>
<td>&lt;= 100 %</td>
</tr>
<tr>
<td>CAS-No.</td>
<td>64-17-5</td>
<td></td>
</tr>
<tr>
<td>EC-No.</td>
<td>200-578-6</td>
<td></td>
</tr>
<tr>
<td>Index-No.</td>
<td>603-002-00-5</td>
<td>&gt;= 50 %: Eye Irrit. 2A, H319;</td>
</tr>
</tbody>
</table>

For the full text of the H-Statements mentioned in this Section, see Section 16.

SECTION 4: First aid measures

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If swallowed
Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available
SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
Carbon oxides

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
Use water spray to cool unopened containers.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
Use personal protective equipment. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapours accumulating to form explosive concentrations. Vapours can accumulate in low areas.
For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

6.3 Methods and materials for containment and cleaning up
Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations (see section 13).

6.4 Reference to other sections
For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid inhalation of vapour or mist. Keep away from sources of ignition - No smoking. Take measures to prevent the build up of electrostatic charge.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Store in cool place. Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.
Hygroscopic.
Storage class (TRGS 510): Flammable liquids

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Components with workplace control parameters

<table>
<thead>
<tr>
<th>Derived No Effect Level (DNEL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Application Area</td>
</tr>
<tr>
<td>Workers</td>
</tr>
<tr>
<td>Workers</td>
</tr>
<tr>
<td>Workers</td>
</tr>
<tr>
<td>Workers</td>
</tr>
</tbody>
</table>
Predicted No Effect Concentration (PNEC)

<table>
<thead>
<tr>
<th>Compartment</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soil</td>
<td>0.63 mg/kg</td>
</tr>
<tr>
<td>Marine water</td>
<td>0.79 mg/l</td>
</tr>
<tr>
<td>Fresh water</td>
<td>0.96 mg/l</td>
</tr>
<tr>
<td>Fresh water sediment</td>
<td>3.6 mg/l</td>
</tr>
<tr>
<td>Sewage treatment plant</td>
<td>580 mg/l</td>
</tr>
</tbody>
</table>

8.2 Exposure controls

Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove’s outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

The selected protective gloves have to satisfy the specifications of EU Directive 89/686/EEC and the standard EN 374 derived from it.

Full contact
Material: butyl-rubber
Minimum layer thickness: 0.3 mm
Break through time: 480 min
Material tested: Butoject® (KCL 897 / Aldrich Z677647, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.2 mm
Break through time: 38 min
Material tested: Dermatril® P (KCL 743 / Aldrich Z677388, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
impervious clothing, Flame retardant antistatic protective clothing,. The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains.
SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appearance</td>
<td>Form: liquid</td>
</tr>
<tr>
<td></td>
<td>Colour: colourless</td>
</tr>
<tr>
<td>Odour</td>
<td>No data available</td>
</tr>
<tr>
<td>Odour Threshold</td>
<td>No data available</td>
</tr>
<tr>
<td>pH</td>
<td>No data available</td>
</tr>
<tr>
<td>Melting point/freezing point</td>
<td>Melting point/range: -114 °C</td>
</tr>
<tr>
<td>Initial boiling point and boiling range</td>
<td>78 °C</td>
</tr>
<tr>
<td>Flash point</td>
<td>14,0 °C - closed cup</td>
</tr>
<tr>
<td>Evaporation rate</td>
<td>No data available</td>
</tr>
<tr>
<td>Flammability (solid, gas)</td>
<td>No data available</td>
</tr>
<tr>
<td>Upper/lower flammability or explosive limits</td>
<td>Upper explosion limit: 19 %(V)</td>
</tr>
<tr>
<td></td>
<td>Lower explosion limit: 3,3 %(V)</td>
</tr>
<tr>
<td>Vapour pressure</td>
<td>59,5 hPa at 20,0 °C</td>
</tr>
<tr>
<td>Vapour density</td>
<td>No data available</td>
</tr>
<tr>
<td>Relative density</td>
<td>0,789 g/mL at 25 °C</td>
</tr>
<tr>
<td>Water solubility</td>
<td>completely soluble</td>
</tr>
<tr>
<td>Partition coefficient: n-octanol/water</td>
<td>log Pow: -0,349 at 24 °C</td>
</tr>
<tr>
<td>Auto-ignition temperature</td>
<td>363,0 °C</td>
</tr>
<tr>
<td>Decomposition temperature</td>
<td>No data available</td>
</tr>
<tr>
<td>Viscosity</td>
<td>No data available</td>
</tr>
<tr>
<td>Explosive properties</td>
<td>No data available</td>
</tr>
<tr>
<td>Oxidizing properties</td>
<td>No data available</td>
</tr>
</tbody>
</table>

9.2 Other safety information
No data available

SECTION 10: Stability and reactivity

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
Heat, flames and sparks.

10.5 Incompatible materials
Alkali metals, Oxidizing agents, Peroxides
10.6 **Hazardous decomposition products**
Other decomposition products - No data available
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 **Information on toxicological effects**

**Acute toxicity**
LD50 Oral - Rat - 10.470 mg/kg
LC50 Inhalation - Rat - 4 h - 30.000 mg/l
LD50 Dermal - Rabbit - 15.800 mg/kg

**Skin corrosion/irritation**
Skin - Rabbit
Result: No skin irritation - 24 h
(OECD Test Guideline 404)

**Serious eye damage/eye irritation**
Eyes - Rabbit
Result: Moderate eye irritation
(OECD Test Guideline 405)

**Respiratory or skin sensitisation**
No data available

**Germ cell mutagenicity**
No data available

**Carcinogenicity**
Carcinogenicity - Mouse - Oral

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

**Reproductive toxicity**
Reproductive toxicity - Human - female - Oral
Effects on Newborn: Apgar score (human only). Effects on Newborn: Other neonatal measures or effects. Effects on Newborn: Drug dependence.

**Specific target organ toxicity - single exposure**
No data available

**Specific target organ toxicity - repeated exposure**
No data available

**Aspiration hazard**
No data available

**Additional Information**
RTECS: KQ6300000
Central nervous system depression, narcosis, Damage to the heart., To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

SECTION 12: Ecological information

12.1 **Toxicity**

Toxicity to fish
LC50 - Pimephales promelas (fathead minnow) - 14.200 mg/l - 96 h

Toxicity to daphnia and other aquatic
LC50 - Ceriodaphnia dubia (water flea) - 5.012 mg/l - 48 h
invertebrates

NOEC - Daphnia magna (Water flea) - 9.6 mg/l - 9 d
Toxicity to algae
EC50 - Chlorella vulgaris (Fresh water algae) - 275 mg/l - 72 h
(OECD Test Guideline 201)

12.2 Persistence and degradability
Biodegradability Result: 95 % - Readily biodegradable

12.3 Bioaccumulative potential
Due to the distribution coefficient n-octanol/water, accumulation in organisms is not expected.

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
This substance/mixture contains no components considered to be either persistent, bioaccumulative and
toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

12.6 Other adverse effects
No data available

SECTION 13: Disposal considerations

13.1 Waste treatment methods
Product
Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting
as this material is highly flammable. Offer surplus and non-recyclable solutions to a licensed disposal
company.

Contaminated packaging
Dispose of as unused product.

SECTION 14: Transport information

14.1 UN number
ADR/RID: 1170 IMDG: 1170 IATA: 1170

14.2 UN proper shipping name
ADR/RID: ETHANOL
IMDG: ETHANOL
IATA: Ethanol

14.3 Transport hazard class(es)
ADR/RID: 3 IMDG: 3 IATA: 3

14.4 Packaging group
ADR/RID: II IMDG: II IATA: II

14.5 Environmental hazards
ADR/RID: no IMDG Marine pollutant: no IATA: no

14.6 Special precautions for user
No data available

SECTION 15: Regulatory information

This safety datasheet complies with the requirements of Regulation (EC) No. 453/2010.

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture

15.2 Chemical Safety Assessment
A Chemical Safety Assessment has been carried out for this substance.
SECTION 16: Other information

Full text of H-Statements referred to under sections 2 and 3.

H225 Highly flammable liquid and vapour.
H319 Causes serious eye irritation.

Further information
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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.
SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers
   Product name: Styrene

   Product Number: S4972
   Brand: Sigma-Aldrich
   Index-No.: 601-026-00-0
   REACH No.: A registration number is not available for this substance as the substance or its uses are exempted from registration, the annual tonnage does not require a registration or the registration is envisaged for a later registration deadline.
   CAS-No.: 100-42-5

1.2 Relevant identified uses of the substance or mixture and uses advised against
   Identified uses: Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet
   Company: Sigma-Aldrich Chemie GmbH
   Riedstrasse 2
   D-89556 STEINHEIM
   Telephone: +49 89-6513-1444
   Fax: +49 7329-97-2319
   E-mail address: eurtechserv@sial.com

1.4 Emergency telephone number
   Emergency Phone #
   0800 181 7059 (CHEMTREC Deutschland)
   +49 (0)696 43508409 (CHEMTREC weltweit)

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture
   Classification according to Regulation (EC) No 1272/2008
   Flammable liquids (Category 3), H226
   Acute toxicity, Inhalation (Category 4), H332
   Skin irritation (Category 2), H315
   Eye irritation (Category 2), H319
   Reproductive toxicity (Category 2), H361d
   Specific target organ toxicity - repeated exposure (Category 1), H372

   For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 Label elements
   Labelling according Regulation (EC) No 1272/2008
   Pictogram: 
   ![Pictogram]
Signal word | Danger
---|---
Hazard statement(s) | Flammable liquid and vapour.  
| Causes skin irritation.  
| Causes serious eye irritation.  
| Harmful if inhaled.  
| Suspected of damaging the unborn child.  
| Causes damage to organs through prolonged or repeated exposure.
Precautionary statement(s) | Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.  
| Do not breathe dust/ fume/ gas/ mist/ vapours/ spray.  
| Wear protective gloves/ protective clothing/ eye protection/ face protection.  
| IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.  
| In case of fire: Use dry powder or dry sand to extinguish.
Supplemental Hazard Statements | none

### 2.3 Other hazards
This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher. Lachrymator.

### SECTION 3: Composition/information on ingredients

#### 3.1 Substances

<table>
<thead>
<tr>
<th>Component</th>
<th>Classification</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAS-No.</td>
<td>Flame Liquid 3; Acute Toxicity 4; Skin Irritant 2; Eye Irritant 2; Reproductive Toxicity 2; STOT RE 1; H226, H332, H315, H319, H361d, H372</td>
<td>&lt;= 100 %</td>
</tr>
</tbody>
</table>

For the full text of the H-Statements mentioned in this Section, see Section 16.

### SECTION 4: First aid measures

#### 4.1 Description of first aid measures

*General advice*
Consult a physician. Show this safety data sheet to the doctor in attendance.

*If inhaled*
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

*In case of skin contact*
Wash off with soap and plenty of water. Take victim immediately to hospital. Consult a physician.

*In case of eye contact*
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.
If swallowed
Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 **Most important symptoms and effects, both acute and delayed**
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 **Indication of any immediate medical attention and special treatment needed**
No data available

SECTION 5: Firefighting measures

5.1 **Extinguishing media**
- **Suitable extinguishing media**
  Dry powder 
  Dry sand
- **Unsuitable extinguishing media**
  Do NOT use water jet.

5.2 **Special hazards arising from the substance or mixture**
Container explosion may occur under fire conditions. Vapours may form explosive mixture with air.

5.3 **Advice for firefighters**
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 **Further information**
Use water spray to cool unopened containers.

SECTION 6: Accidental release measures

6.1 **Personal precautions, protective equipment and emergency procedures**
Use personal protective equipment. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapours accumulating to form explosive concentrations. Vapours can accumulate in low areas.
For personal protection see section 8.

6.2 **Environmental precautions**
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 **Methods and materials for containment and cleaning up**
Contain spillage, and then collect with non-combustible absorbent material, (e.g. sand, earth, diatomaceous earth, vermiculite) and place in container for disposal according to local / national regulations (see section 13).

6.4 **Reference to other sections**
For disposal see section 13.

SECTION 7: Handling and storage

7.1 **Precautions for safe handling**
Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.
Keep away from sources of ignition - No smoking. Take measures to prevent the build up of electrostatic charge.
For precautions see section 2.2.

7.2 **Conditions for safe storage, including any incompatibilities**
Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage. Store in cool place.
Recommended storage temperature 2 - 8 °C
Light sensitive.
7.3 Specific end use(s)  
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

SECTION 8: Exposure controls/personal protection

8.1 Control parameters  
Components with workplace control parameters

8.2 Exposure controls  
Appropriate engineering controls  
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection  
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection  
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove’s outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

The selected protective gloves have to satisfy the specifications of EU Directive 89/686/EEC and the standard EN 374 derived from it.

Full contact  
Material: Fluorinated rubber  
Minimum layer thickness: 0.7 mm  
Break through time: > 480 min  
Material tested: Vitoject® (KCL 890 / Aldrich Z677698, Size M)

Splash contact  
Material: Nitrile rubber  
Minimum layer thickness: 0.4 mm  
Break through time: 32 min  
Material tested: Camatri® (KCL 730 / Aldrich Z677442, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374

If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection  
Complete suit protecting against chemicals, Flame retardant antistatic protective clothing. The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection  
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure  
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.
SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties
   a) Appearance  
      Form: liquid, clear  
      Colour: colourless
   b) Odour  
      sweet
   c) Odour Threshold  
      No data available
   d) pH  
      No data available
   e) Melting point/freezing point  
      Melting point/range: -31 °C - lit.
   f) Initial boiling point and boiling range  
      145 - 146 °C - lit.
   g) Flash point  
      32,0 °C - closed cup
   h) Evaporation rate  
      No data available
   i) Flammability (solid, gas)  
      No data available
   j) Upper/lower flammability or explosive limits  
      Upper explosion limit: 8,9 %(V)
      Lower explosion limit: 1,1 %(V)
   k) Vapour pressure  
      6 hPa at 20 °C
   l) Vapour density  
      3,6
   m) Relative density  
      0,906 g/cm3 at 25 °C
   n) Water solubility  
      0,05 g/l at 25 °C - slightly soluble
   o) Partition coefficient: n-octanol/water  
      No data available
   p) Auto-ignition temperature  
      490,0 °C
   q) Decomposition temperature  
      480,0 °C
   r) Viscosity  
      No data available
   s) Explosive properties  
      No data available
   t) Oxidizing properties  
      No data available

9.2 Other safety information
   Relative vapour density  
   3,6

SECTION 10: Stability and reactivity

10.1 Reactivity  
      No data available

10.2 Chemical stability  
      Stable under recommended storage conditions.  
      Contains the following stabiliser(s):  
      4-tert-Butylpyrocatechol (>=30 - <=50 ppm)

10.3 Possibility of hazardous reactions  
      No data available

10.4 Conditions to avoid  
      May polymerize on exposure to light.  
      Heat, flames and sparks.
10.5 Incompatible materials
Oxidizing agents, Copper

10.6 Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Carbon oxides
Other decomposition products - No data available
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - > 6.000 mg/kg
LC50 Inhalation - Rat - 4 h - 12.000 mg/m3
LD50 Dermal - Rat - male and female - > 2.000 mg/kg

Skin corrosion/irritation
Skin - Rabbit
Result: Skin irritation
(OECD Test Guideline 404)

Serious eye damage/eye irritation
Eyes - Rabbit
Result: Eye irritation - 24 h

Respiratory or skin sensitisation
Maximisation Test - Guinea pig
Does not cause skin sensitisation.
(OECD Test Guideline 406)

Germ cell mutagenicity
Laboratory experiments have shown mutagenic effects.

Carcinogenicity
This product is or contains a component that has been reported to be possibly carcinogenic based on its
IARC, ACGIH, NTP, or EPA classification.

IARC: 2B - Group 2B: Possibly carcinogenic to humans (Styrene)

Reproductive toxicity
Suspected of damaging the unborn child. Suspected human reproductive toxicant

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
Causes damage to organs through prolonged or repeated exposure.

Aspiration hazard
No data available

Additional Information
RTECS: WL3675000
Dermatitis, Central nervous system depression, Nausea, Dizziness, Headache, To the best of our
knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.
Endocrine system. -

SECTION 12: Ecological information

12.1 Toxicity
Toxicity to fish
NOEC - Pimephales promelas (fathead minnow) - 4 mg/l - 96 h
LC50 - Pimephales promelas (fathead minnow) - 32 mg/l - 96 h
LOEC - Pimephales promelas (fathead minnow) - 7,6 mg/l - 96 h
Toxicity to daphnia and other aquatic invertebrates
EC50 - Daphnia magna (Water flea) - 4,7 mg/l - 48 h
(OECD Test Guideline 202)
Toxicity to algae
IC50 - Pseudokirchneriella subcapitata (green algae) - 1,4 mg/l - 72 h

12.2 Persistence and degradability
Biodegradability
- aerobic Exposure time 28 d
Result: > 60 % - Readily biodegradable.

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

12.6 Other adverse effects
Toxic to aquatic life.
No data available

SECTION 13: Disposal considerations

13.1 Waste treatment methods
Product
Offer surplus and non-recyclable solutions to a licensed disposal company. Waste material must be disposed of in accordance with the Directive on waste 2008/98/EC as well as other national and local regulations. Leave chemicals in original containers. No mixing with other waste. Handle uncleaned containers like the product itself.

Contaminated packaging
Dispose of as unused product.

SECTION 14: Transport information

14.1 UN number
ADR/RID: 2055
IMDG: 2055
IATA: 2055

14.2 UN proper shipping name
ADR/RID: STYRENE MONOMER, STABILIZED
IMDG: STYRENE MONOMER, STABILIZED
IATA: Styrene monomer, stabilized

14.3 Transport hazard class(es)
ADR/RID: 3
IMDG: 3
IATA: 3

14.4 Packaging group
ADR/RID: III
IMDG: III
IATA: III

14.5 Environmental hazards
ADR/RID: no
IMDG Marine pollutant: no
IATA: no

14.6 Special precautions for user
No data available

SECTION 15: Regulatory information

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture
This safety datasheet complies with the requirements of Regulation (EC) No. 1907/2006.
15.2  **Chemical safety assessment**  
For this product a chemical safety assessment was not carried out

---

**SECTION 16: Other information**

**Full text of H-Statements referred to under sections 2 and 3.**

- **H226**  Flammable liquid and vapour.
- **H315**  Causes skin irritation.
- **H319**  Causes serious eye irritation.
- **H332**  Harmful if inhaled.
- **H361d** Suspected of damaging the unborn child.
- **H372**  Causes damage to organs through prolonged or repeated exposure.

**Further information**

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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.
Material Safety Data Sheet
Tristearin MSDS

Section 1: Chemical Product and Company Identification

Product Name: Tristearin
Catalog Codes: SLT1306
CAS#: 555-43-1
RTECS: Not available.
TSCA: TSCA 8(b) inventory: Tristearin
CI#: Not available.
Synonym: Pationic 919; Glycowax S 932; Stearin; Stearin, tri; Dynasan 118; Hardened Oil; Glyceryl tristearate; Glycerol Tristearate; Stearic Acid Triglyceride; Glycerol, Trioctadecanoate; Steroyl Triglyceride; Trioctadecanoin; Octadecanoic Acid, 1,2,3-Propanetriyl Ester; Triglyceryl Stearate; Tristeerin
Chemical Name: Stearic Acid Triglycerin Ester
Chemical Formula: C57-H110-O6

Contact Information:
Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396
US Sales: 1-800-901-7247
International Sales: 1-281-441-4400
Order Online: ScienceLab.com
CHEMTREC (24HR Emergency Telephone), call:
1-800-424-9300
International CHEMTREC, call: 1-703-527-3887
For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

<table>
<thead>
<tr>
<th>Name</th>
<th>CAS #</th>
<th>% by Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tristearin</td>
<td>555-43-1</td>
<td>100</td>
</tr>
</tbody>
</table>

Toxicological Data on Ingredients: Not applicable.

Section 3: Hazards Identification

Potential Acute Health Effects: Slightly hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion, of inhalation.

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: Not available. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. Repeated or prolonged exposure is not known to aggravate medical condition.

Section 4: First Aid Measures
Eye Contact:  
Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention if irritation occurs.

Skin Contact:  
Wash with soap and water. Cover the irritated skin with an emollient. Get medical attention if irritation develops.

Serious Skin Contact:  
Not available.

Inhalation:  
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

Serious Inhalation:  
Not available.

Ingestion:  
Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If large quantities of this material are swallowed, call a physician immediately. Loosen tight clothing such as a collar, tie, belt or waistband.

Serious Ingestion:  
Not available.

Section 5: Fire and Explosion Data

Flammability of the Product:  
May be combustible at high temperature.

Auto-Ignition Temperature:  
Not available.

Flash Points:  
OPEN CUP: 298°C (568.4°F).

Flammable Limits:  
Not available.

Products of Combustion:  
These products are carbon oxides (CO, CO2).

Fire Hazards in Presence of Various Substances:  
Slightly flammable to flammable in presence of heat. Non-flammable in presence of shocks.

Explosion Hazards in Presence of Various Substances:  
Slightly explosive in presence of open flames and sparks. Non-explosive in presence of shocks.

Fire Fighting Media and Instructions:  
SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use water spray, fog or foam. Do not use water jet.

Special Remarks on Fire Hazards:  
As with most organic solids, fire is possible at elevated temperatures

Special Remarks on Explosion Hazards:  
Fine dust dispersed in air in sufficient concentrations, and in the presences of an ignition source is a potential dust explosion hazard.

Section 6: Accidental Release Measures

Small Spill:  
Use appropriate tools to put the spilled solid in a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and dispose of according to local and regional authority requirements.

Large Spill:  
Use a shovel to put the material into a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and allow to evacuate through the sanitary system.

Section 7: Handling and Storage

Precautions:
Keep away from heat. Keep away from sources of ignition. Do not breathe dust. Keep away from incompatibles such as oxidizing agents.

**Storage:** Keep container tightly closed. Keep container in a cool, well-ventilated area.

### Section 8: Exposure Controls/Personal Protection

**Engineering Controls:**
Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

**Personal Protection:** Safety glasses. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

**Personal Protection in Case of a Large Spill:**
Splash goggles. Full suit. Dust respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

**Exposure Limits:** Not available.

### Section 9: Physical and Chemical Properties

**Physical state and appearance:** Solid. (Solid powder.)

**Odor:** Odorless.

**Taste:** Tasteless.

**Molecular Weight:** 891.45g/mole

**Color:** White. Off-white.

**pH (1% soln/water):** Not applicable.

**Boiling Point:** Not available.

**Melting Point:** 68°C (154.4°F)

**Critical Temperature:** Not available.

**Specific Gravity:** 0.8559 (Water = 1)

**Vapor Pressure:** Not applicable.

**Vapor Density:** Not available.

**Volutility:** Not available.

**Odor Threshold:** Not available.

**Water/Oil Dist. Coeff.:** Not available.

**Ionicity (in Water):** Not available.

**Dispersion Properties:** Not available.

**Solubility:**

### Section 10: Stability and Reactivity Data
### Stability
The product is stable.

### Instability Temperature
Not available.

### Conditions of Instability
Excess heat, incompatible materials

### Incompatibility with various substances
Reactive with oxidizing agents.

### Corrosivity
Non-corrosive in presence of glass.

### Special Remarks on Reactivity
Not available.

### Special Remarks on Corrosivity
Not available.

### Polymerization
Will not occur.

---

### Section 11: Toxicological Information

#### Routes of Entry
Inhalation.

#### Toxicity to Animals
LD50: Not available. LC50: Not available.

#### Chronic Effects on Humans
Not available.

#### Other Toxic Effects on Humans
Slightly hazardous in case of skin contact (irritant), of ingestion, of inhalation.

#### Special Remarks on Toxicity to Animals
Not available.

#### Special Remarks on Chronic Effects on Humans
Not available.

#### Special Remarks on other Toxic Effects on Humans
Acute Potential Health Effects: May cause skin, eye, respiratory tract, and gastrointestinal tract irritation. The toxicological properties of this substance have not been fully investigated.

---

### Section 12: Ecological Information

#### Ecotoxicity
Not available.

#### BOD5 and COD
Not available.

#### Products of Biodegradation
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

#### Toxicity of the Products of Biodegradation
The product itself and its products of degradation are not toxic.

#### Special Remarks on the Products of Biodegradation
Not available.

---

### Section 13: Disposal Considerations

#### Waste Disposal
Waste must be disposed of in accordance with federal, state and local environmental control regulations.

---

### Section 14: Transport Information

#### DOT Classification
Not a DOT controlled material (United States).

#### Identification
Not applicable.

#### Special Provisions for Transport
Not applicable.
Section 15: Other Regulatory Information

Federal and State Regulations: TSCA 8(b) inventory: Tristearin

Other Regulations: EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

Other Classifications:

WHMIS (Canada): Not controlled under WHMIS (Canada).

DSCL (EEC):
This product is not classified according to the EU regulations. Not applicable.

HMIS (U.S.A.):

Health Hazard: 1
Fire Hazard: 1
Reactivity: 0
Personal Protection: E

National Fire Protection Association (U.S.A.):

Health: 1
Flammability: 1
Reactivity: 0
Specific hazard:

Protective Equipment:
Gloves. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Safety glasses.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

Created: 10/10/2005 08:55 PM
Last Updated: 05/21/2013 12:00 PM

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall ScienceLab.com be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if ScienceLab.com has been advised of the possibility of such damages.
SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers
   Product name: Toluene

   | Product Number  | 244511 |
   | Brand           | Sigma-Aldrich |
   | Index-No.       | 601-021-00-3 |
   | REACH No.       | 01-2119471310-51-XXXX |
   | CAS-No.         | 108-88-3 |

1.2 Relevant identified uses of the substance or mixture and uses advised against
   Identified uses: Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet
   Company: Sigma-Aldrich Chemie GmbH
   Riedstrasse 2
   D-89555 STEINHEIM
   Telephone: +49 89-6513-1444
   Fax: +49 7329-97-2319
   E-mail address: eurtechserv@sial.com

1.4 Emergency telephone number
   Emergency Phone #
   0800 181 7059 (CHEMTREC Deutschland)
   +49 (0)696 43508409 (CHEMTREC weltweit)

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture
   Classification according to Regulation (EC) No 1272/2008
   Flammable liquids (Category 2), H225
   Skin irritation (Category 2), H315
   Reproductive toxicity (Category 2), H361d
   Specific target organ toxicity - single exposure (Category 3), Central nervous system, H336
   Specific target organ toxicity - repeated exposure (Category 2), H373
   Aspiration hazard (Category 1), H304

   For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 Label elements
   Labelling according Regulation (EC) No 1272/2008
   Pictogram
   ![Pictogram]
   Signal word: Danger
   Hazard statement(s):
   H225: Highly flammable liquid and vapour.
   H304: May be fatal if swallowed and enters airways.
H315 Causes skin irritation.
H336 May cause drowsiness or dizziness.
H361d Suspected of damaging the unborn child.
H373 May cause damage to organs through prolonged or repeated exposure.

Precautionary statement(s)
P210 Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
P260 Do not breathe dust/ fume/ gas/ mist/ vapours/ spray.
P280 Wear protective gloves/ protective clothing/ eye protection/ face protection.
P301 + P310 IF SWALLOWED: Immediately call a POISON CENTER/doctor.
P370 + P378 In case of fire: Use dry powder or dry sand to extinguish.
P403 + P235 Store in a well-ventilated place. Keep cool.

Supplemental Hazard: none

2.3 Other hazards
This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

SECTION 3: Composition/information on ingredients

3.1 Substances
Formula: C7H8
Molecular weight: 92.14 g/mol
CAS-No.: 108-88-3
EC-No.: 203-625-9
Index-No.: 601-021-00-3
Registration number: 01-2119471310-51-XXXX

Hazardous ingredients according to Regulation (EC) No 1272/2008

<table>
<thead>
<tr>
<th>Component</th>
<th>Classification</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Toluene</td>
<td>Flam. Liq. 2; Skin Irrit. 2; Repr. 2; STOT SE 3; STOT RE 2; Asp. Tox. 1; H225, H315, H361d, H336, H373, H304</td>
<td>&lt;= 100 %</td>
</tr>
<tr>
<td>CAS-No.</td>
<td>108-88-3</td>
<td></td>
</tr>
<tr>
<td>EC-No.</td>
<td>203-625-9</td>
<td></td>
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<tr>
<td>Index-No.</td>
<td>601-021-00-3</td>
<td></td>
</tr>
<tr>
<td>Registration number</td>
<td>01-2119471310-51-XXXX</td>
<td></td>
</tr>
</tbody>
</table>

For the full text of the H-Statements mentioned in this Section, see Section 16.

SECTION 4: First aid measures

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.
4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

SECTION 5: Firefighting measures

5.1 Extinguishing media
Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
No data available

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
Use water spray to cool unopened containers.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
Use personal protective equipment. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapours accumulating to form explosive concentrations. Vapours can accumulate in low areas. For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up
Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations (see section 13).

6.4 Reference to other sections
For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid inhalation of vapour or mist. Keep away from sources of ignition - No smoking. Take measures to prevent the build up of electrostatic charge. For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Store in cool place. Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.
Handle and store under inert gas.

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated
SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Components with workplace control parameters

**Derived No Effect Level (DNEL)**

<table>
<thead>
<tr>
<th>Application Area</th>
<th>Exposure routes</th>
<th>Health effect</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Workers</td>
<td>Inhalation</td>
<td>Acute systemic effects</td>
<td>384 mg/m³</td>
</tr>
<tr>
<td>Workers</td>
<td>Inhalation</td>
<td>Acute local effects</td>
<td>384 mg/m³</td>
</tr>
<tr>
<td>Workers</td>
<td>Skin contact</td>
<td>Long-term systemic effects</td>
<td>384 mg/kg BW/d</td>
</tr>
<tr>
<td>Workers</td>
<td>Inhalation</td>
<td>Long-term systemic effects</td>
<td>192 mg/m³</td>
</tr>
<tr>
<td>Workers</td>
<td>Inhalation</td>
<td>Long-term local effects</td>
<td>192 mg/m³</td>
</tr>
<tr>
<td>Consumers</td>
<td>Inhalation</td>
<td>Acute systemic effects</td>
<td>226 mg/m³</td>
</tr>
<tr>
<td>Consumers</td>
<td>Inhalation</td>
<td>Acute local effects</td>
<td>226 mg/m³</td>
</tr>
<tr>
<td>Consumers</td>
<td>Skin contact</td>
<td>Long-term systemic effects</td>
<td>226 mg/kg BW/d</td>
</tr>
<tr>
<td>Consumers</td>
<td>Inhalation</td>
<td>Long-term systemic effects</td>
<td>56.5 mg/m³</td>
</tr>
<tr>
<td>Consumers</td>
<td>Ingestion</td>
<td>Long-term systemic effects</td>
<td>8.13 mg/kg BW/d</td>
</tr>
</tbody>
</table>

**Predicted No Effect Concentration (PNEC)**

<table>
<thead>
<tr>
<th>Compartment</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soil</td>
<td>2.89 mg/kg</td>
</tr>
<tr>
<td>Marine water</td>
<td>0.68 mg/l</td>
</tr>
<tr>
<td>Fresh water</td>
<td>0.68 mg/l</td>
</tr>
<tr>
<td>Marine sediment</td>
<td>16.39 mg/kg</td>
</tr>
<tr>
<td>Fresh water sediment</td>
<td>16.39 mg/kg</td>
</tr>
<tr>
<td>Sewage treatment plant</td>
<td>13.61 mg/l</td>
</tr>
<tr>
<td>Aquatic intermittent release</td>
<td>0.68 mg/l</td>
</tr>
</tbody>
</table>

8.2 Exposure controls

**Appropriate engineering controls**
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

**Personal protective equipment**

**Eye/face protection**
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

**Skin protection**
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove’s outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

The selected protective gloves have to satisfy the specifications of EU Directive 89/686/EEC and the standard EN 374 derived from it.

**Full contact**
Material: Fluorinated rubber
Minimum layer thickness: 0.7 mm
Break through time: 480 min
Material tested: Vitoject® (KCL 890 / Aldrich Z677698, Size M)

**Splash contact**
Material: Fluorinated rubber
Minimum layer thickness: 0.7 mm
Break through time: 480 min
Material tested: Vitoject® (KCL 890 / Aldrich Z677698, Size M)
Body Protection
Complete suit protecting against chemicals, Flame retardant antistatic protective clothing., The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a) Appearance Form: liquid
Colour: colourless

b) Odour aromatic

c) Odour Threshold No data available

d) pH No data available

e) Melting point/freezing point Melting point/range: -93 °C

f) Initial boiling point and boiling range 110 - 111 °C

g) Flash point 4,0 °C - closed cup

h) Evaporation rate No data available

i) Flammability (solid, gas) No data available

j) Upper/lower flammability or explosive limits Upper explosion limit: 7 %(V)
Lower explosion limit: 1,2 %(V)

k) Vapour pressure 29,1 hPa at 20,0 °C

l) Vapour density No data available

m) Relative density 0,865 g/mL at 25 °C

n) Water solubility 0,5 g/l at 15 °C

o) Partition coefficient: n-octanol/water No data available

p) Auto-ignition temperature 535,0 °C

q) Decomposition temperature No data available

r) Viscosity No data available
s) Explosive properties  No data available
   t) Oxidizing properties  No data available

9.2  Other safety information
     No data available

SECTION 10: Stability and reactivity

10.1  Reactivity
      No data available

10.2  Chemical stability
      Stable under recommended storage conditions.

10.3  Possibility of hazardous reactions
      No data available

10.4  Conditions to avoid
      Heat, flames and sparks.

10.5  Incompatible materials
      Strong oxidizing agents

10.6  Hazardous decomposition products
      Hazardous decomposition products formed under fire conditions. - Carbon oxides
      Other decomposition products - No data available
      In the event of fire: see section 5

SECTION 11: Toxicological information

11.1  Information on toxicological effects

   Acute toxicity
   LD50 Oral - Rat - > 5.580 mg/kg
   LC50 Inhalation - Rat - 4 h - 12.500 - 28.800 mg/m³
   LD50 Dermal - Rabbit - 12.196 mg/kg

   Skin corrosion/irritation
   Skin - Rabbit
   Result: Skin irritation - 24 h

   Serious eye damage/eye irritation
   Eyes - Rabbit
   Result: No eye irritation
   (OECD Test Guideline 405)

   Respiratory or skin sensitisation
   No data available

   Germ cell mutagenicity
   Rat
   Liver
   DNA damage

   Carcinogenicity
   IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

   Reproductive toxicity
   Damage to fetus possible
   Suspected human reproductive toxicant
   Reproductive toxicity - Rat - Inhalation
   Paternal Effects: Spermatogenesis (including genetic material, sperm morphology, motility, and count).
Experiments have shown reproductive toxicity effects in male and female laboratory animals.

Developmental Toxicity - Rat - Oral
Effects on Embryo or Fetus: Fetotoxicity (except death, e.g., stunted fetus).

**Specific target organ toxicity - single exposure**
No data available

**Specific target organ toxicity - repeated exposure**
No data available

**Aspiration hazard**
No data available

**Additional Information**
RTECS: XS5250000

Lung irritation, chest pain, pulmonary edema. Inhalation studies on toluene have demonstrated the development of inflammatory and ulcerous lesions of the penis, prepuce, and scrotum in animals. Central nervous system

---

### SECTION 12: Ecological information

#### 12.1 Toxicity

- **Toxicity to fish**  
  LC50 - Oncorhynchus mykiss (rainbow trout) - 7,63 mg/l - 96 h
  NOEC - Pimephales promelas (fathead minnow) - 5,44 mg/l - 7 d

- **Toxicity to daphnia and other aquatic invertebrates**  
  EC50 - Daphnia magna (Water flea) - 8,00 mg/l - 24 h
  Immobilization EC50 - Daphnia magna (Water flea) - 6 mg/l - 48 h

- **Toxicity to algae**  
  EC50 - Chlorella vulgaris (Fresh water algae) - 245,00 mg/l - 24 h
  EC50 - Pseudokirchneriella subcapitata (green algae) - 10,00 mg/l - 24 h

#### 12.2 Persistence and degradability

**Biodegradability**
Result: - Readily biodegradable

#### 12.3 Bioaccumulative potential

**Bioaccumulation**
Leuciscus idus (Golden orfe) - 3 d
- 0,05 mg/l

Bioconcentration factor (BCF): 90

#### 12.4 Mobility in soil

No data available

#### 12.5 Results of PBT and vPvB assessment

This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

#### 12.6 Other adverse effects

Toxic to aquatic life.

---

### SECTION 13: Disposal considerations

#### 13.1 Waste treatment methods

**Product**
Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Offer surplus and non-recyclable solutions to a licensed disposal company.

**Contaminated packaging**
Dispose of as unused product.
SECTION 14: Transport information

14.1 UN number
ADR/RID: 1294  IMDG: 1294  IATA: 1294

14.2 UN proper shipping name
ADR/RID: TOLUENE  IMDG: TOLUENE  IATA: Toluene

14.3 Transport hazard class(es)
ADR/RID: 3  IMDG: 3  IATA: 3

14.4 Packaging group
ADR/RID: II  IMDG: II  IATA: II

14.5 Environmental hazards
ADR/RID: no  IMDG Marine pollutant: no  IATA: no

14.6 Special precautions for user
No data available

SECTION 15: Regulatory information

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture
This safety datasheet complies with the requirements of Regulation (EC) No. 1907/2006.

Authorisations and/or restrictions on use
REACH - Restrictions on the manufacture, placing on the market and use of certain dangerous substances, preparations and articles (Annex XVII)

15.2 Chemical safety assessment
A Chemical Safety Assessment has been carried out for this substance.

SECTION 16: Other information

Full text of H-Statements referred to under sections 2 and 3.
H225  Highly flammable liquid and vapour.
H304  May be fatal if swallowed and enters airways.
H315  Causes skin irritation.
H336  May cause drowsiness or dizziness.
H361d Suspected of damaging the unborn child.
H373  May cause damage to organs through prolonged or repeated exposure.

Further information
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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.
SAFETY DATA SHEET

Creation Date 23-Feb-2012  Revision Date 30-May-2017  Revision Number 2

1. Identification

Product Name Vinyltoluene, stabilized with 10 to 15 ppm p-tert-Butylcatechol

Cat No. : AC422611000; AC422615000

Synonyms Ethenylmethylbenzene; Methylstyrene; Styrene, methyl-

Recommended Use Laboratory chemicals.

Uses advised against Not for food, drug, pesticide or biocidal product use

Details of the supplier of the safety data sheet

Company
Fisher Scientific Acros Organics
One Reagent Lane One Reagent Lane
Fair Lawn, NJ 07410 Fair Lawn, NJ 07410
Tel: (201) 796-7100

Emergency Telephone Number
For information US call: 001-800-ACROS-01 / Europe call: +32 14 57 52 11
Emergency Number US:001-201-796-7100 / Europe: +32 14 57 52 99
CHEMTREC Tel. No.US:001-800-424-9300 / Europe:001-703-527-3887

2. Hazard(s) Identification

Classification
This chemical is considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200)

<table>
<thead>
<tr>
<th>Flammable liquids</th>
<th>Category 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute Inhalation Toxicity - Vapors</td>
<td>Category 3</td>
</tr>
<tr>
<td>Skin Corrosion/irritation</td>
<td>Category 2</td>
</tr>
<tr>
<td>Serious Eye Damage/Eye Irritation</td>
<td>Category 2</td>
</tr>
</tbody>
</table>

Label Elements

Signal Word Danger

Hazard Statements
Flammable liquid and vapor
Causes skin irritation
Causes serious eye irritation
Toxic if inhaled
Precautionary Statements

Prevention
Avoid breathing dust/fume/gas/mist/vapors/spray
Use only outdoors or in a well-ventilated area
Wash face, hands and any exposed skin thoroughly after handling
Wear protective gloves/protective clothing/eye protection/face protection
Keep away from heat/sparks/open flames/hot surfaces. - No smoking
Keep container tightly closed
Ground/bond container and receiving equipment
Use explosion-proof electrical/ventilating/lighting/equipment
Use only non-sparking tools
Take precautionary measures against static discharge
Keep cool

Inhalation
IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing
Call a POISON CENTER or doctor/physician

Skin
If skin irritation occurs: Get medical advice/attention
IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower
Wash contaminated clothing before reuse

Eyes
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
If eye irritation persists: Get medical advice/attention

Fire
In case of fire: Use CO2, dry chemical, or foam for extinction

Storage
Store in a well-ventilated place. Keep container tightly closed
Store locked up

Disposal
Dispose of contents/container to an approved waste disposal plant

Hazard not otherwise classified (HNOC)
None identified

3. Composition / Information on Ingredients

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS-No</th>
<th>Weight %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vinyl toluene</td>
<td>25013-15-4</td>
<td>&gt;95</td>
</tr>
</tbody>
</table>

4. First-aid measures

Eye Contact
Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Immediate medical attention is required.

Skin Contact
Wash off immediately with plenty of water for at least 15 minutes. Immediate medical attention is required.

Inhalation
Move to fresh air. If breathing is difficult, give oxygen. Do not use mouth-to-mouth method if victim ingested or inhaled the substance; give artificial respiration with the aid of a pocket
Vinyltoluene, stabilized with 10 to 15 ppm p-tert-Butylcatechol

mask equipped with a one-way valve or other proper respiratory medical device. Immediate medical attention is required.

Ingestion
Do not induce vomiting. Call a physician or Poison Control Center immediately.

Most important symptoms/effects
Breathing difficulties. Symptoms of overexposure may be headache, dizziness, tiredness, nausea and vomiting.

Notes to Physician
Treat symptomatically

5. Fire-fighting measures

Suitable Extinguishing Media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide. Cool closed containers exposed to fire with water spray.

Unsuitable Extinguishing Media
No information available

Flash Point
52 °C / 125 °F

Autoignition Temperature
575 °C

Explosion Limits
Upper
5.2%
Lower
1.1%

Sensitivity to Mechanical Impact
No information available

Sensitivity to Static Discharge
No information available

Specific Hazards Arising from the Chemical
Flammable. Containers may explode when heated. Vapors may form explosive mixtures with air. Vapors may travel to source of ignition and flash back.

Hazardous Combustion Products
Carbon monoxide (CO) Carbon dioxide (CO₂)

Protective Equipment and Precautions for Firefighters
As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear. Thermal decomposition can lead to release of irritating gases and vapors.

6. Accidental release measures

Personal Precautions
Use personal protective equipment. Keep people away from and upwind of spill/leak. Evacuate personnel to safe areas. Remove all sources of ignition. Take precautionary measures against static discharges.

Environmental Precautions
Should not be released into the environment. See Section 12 for additional ecological information.

Methods for Containment and Clean Up
Soak up with inert absorbent material. Keep in suitable, closed containers for disposal. Remove all sources of ignition. Use spark-proof tools and explosion-proof equipment.

7. Handling and storage

Handling
Use only under a chemical fume hood. Wear personal protective equipment. Do not get in eyes, on skin, or on clothing. Keep away from open flames, hot surfaces and sources of ignition. Use only non-sparking tools. Use explosion-proof equipment. Do not breathe vapors/dust. Do not ingest. Take precautionary measures against static discharges.

Storage
Keep containers tightly closed in a dry, cool and well-ventilated place. Keep away from heat and sources of ignition. Refrigerator/flammables.
8. Exposure controls / personal protection

Exposure Guidelines

<table>
<thead>
<tr>
<th>Component</th>
<th>ACGIH TLV</th>
<th>OSHA PEL</th>
<th>NIOSH IDLH</th>
<th>Mexico OEL (TWA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vinyl toluene</td>
<td>TWA: 5 ppm</td>
<td>(Vacated) TWA: 100 ppm</td>
<td>IDLH: 400 ppm</td>
<td>TWA: 50 ppm</td>
</tr>
<tr>
<td></td>
<td>STEL: 100 ppm</td>
<td>TWA: 480 mg/m³</td>
<td>TWA: 100 ppm</td>
<td>TWA: 240 mg/m³</td>
</tr>
</tbody>
</table>

Legend
ACGIH - American Conference of Governmental Industrial Hygienists
OSHA - Occupational Safety and Health Administration
NIOSH IDLH: The National Institute for Occupational Safety and Health Immediately Dangerous to Life or Health

Engineering Measures
Ensure adequate ventilation, especially in confined areas.

Personal Protective Equipment

Eye/face Protection
Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

Skin and body protection
Wear appropriate protective gloves and clothing to prevent skin exposure.

Respiratory Protection
Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

Hygiene Measures
Handle in accordance with good industrial hygiene and safety practice.

9. Physical and chemical properties

<table>
<thead>
<tr>
<th>Physical State</th>
<th>Liquid</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appearance</td>
<td>Clear</td>
</tr>
<tr>
<td>Odor</td>
<td>Strong</td>
</tr>
<tr>
<td>Odor Threshold</td>
<td>No information available</td>
</tr>
<tr>
<td>pH</td>
<td>No information available</td>
</tr>
<tr>
<td>Melting Point/Range</td>
<td>-77 °C / -107 °F</td>
</tr>
<tr>
<td>Boiling Point/Range</td>
<td>168 °C / 334 °F @ 760 mmHg</td>
</tr>
<tr>
<td>Flash Point</td>
<td>52 °C / 125 °F</td>
</tr>
<tr>
<td>Evaporation Rate</td>
<td>No information available</td>
</tr>
<tr>
<td>Flammability (solid,gas)</td>
<td>No information available</td>
</tr>
<tr>
<td>Flammability or explosive limits Upper</td>
<td>5.2%</td>
</tr>
<tr>
<td></td>
<td>Lower: 1.1%</td>
</tr>
<tr>
<td>Vapor Pressure</td>
<td>1.1 mmHg @ 20 °C</td>
</tr>
<tr>
<td>Vapor Density</td>
<td>4.08</td>
</tr>
<tr>
<td>Specific Gravity</td>
<td>0.8930</td>
</tr>
<tr>
<td>Solubility</td>
<td>Insoluble in water</td>
</tr>
<tr>
<td>Partition coefficient; n-octanol/water</td>
<td>No data available</td>
</tr>
<tr>
<td>Autoignition Temperature</td>
<td>575 °C</td>
</tr>
<tr>
<td>Decomposition Temperature</td>
<td>No information available</td>
</tr>
<tr>
<td>Viscosity</td>
<td>No information available</td>
</tr>
<tr>
<td>Molecular Formula</td>
<td>C9H10</td>
</tr>
<tr>
<td>Molecular Weight</td>
<td>118.18</td>
</tr>
</tbody>
</table>
10. Stability and reactivity

- **Reactive Hazard**: None known, based on information available.
- **Stability**: Stable under normal conditions.
- **Conditions to Avoid**: Incompatible products. Excess heat. Keep away from open flames, hot surfaces and sources of ignition.
- **Incompatible Materials**: Strong oxidizing agents.
- **Hazardous Decomposition Products**: Carbon monoxide (CO), Carbon dioxide (CO₂).
- **Hazardous Polymerization**: Hazardous polymerization does not occur.
- **Hazardous Reactions**: None under normal processing.

11. Toxicological information

**Acute Toxicity**

**Component Information**

<table>
<thead>
<tr>
<th>Component</th>
<th>LD50 Oral Oral</th>
<th>LD50 Dermal</th>
<th>LC50 Inhalation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vinyl toluene</td>
<td>LD50 = 2255 mg/kg (Rat)</td>
<td>Not listed</td>
<td>Not listed</td>
</tr>
<tr>
<td></td>
<td>LD50 = 4000 mg/kg (Rat)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Toxicologically Synergistic Products**

No information available

**Delayed and immediate effects as well as chronic effects from short and long-term exposure**

**Irritation**: No information available.

**Sensitization**: No information available.

**Carcinogenicity**: The table below indicates whether each agency has listed any ingredient as a carcinogen.

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS-No</th>
<th>IARC</th>
<th>NTP</th>
<th>ACGIH</th>
<th>OSHA</th>
<th>Mexico</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vinyl toluene</td>
<td>25013-15-4</td>
<td>Not listed</td>
<td>Not listed</td>
<td>Not listed</td>
<td>Not listed</td>
<td>Not listed</td>
</tr>
</tbody>
</table>

**Mutagenic Effects**: No information available.

**Reproductive Effects**: No information available.

**Developmental Effects**: No information available.

**Teratogenicity**: No information available.

**STOT - single exposure**

None known

**STOT - repeated exposure**

None known

**Aspiration hazard**: No information available

**Symptoms / effects, both acute and delayed**

Symptoms of overexposure may be headache, dizziness, tiredness, nausea and vomiting.

**Endocrine Disruptor Information**: No information available

**Other Adverse Effects**: The toxicological properties have not been fully investigated. See actual entry in RTECS for complete information.
12. Ecological Information

Ecotoxicity

Do not empty into drains.

<table>
<thead>
<tr>
<th>Component</th>
<th>Freshwater Algae</th>
<th>Freshwater Fish</th>
<th>Microtox</th>
<th>Water Flea</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vinyl toluene</td>
<td>Not listed</td>
<td>LC50: = 23.4 mg/L, 96h (Pimephales rafinesque)</td>
<td>Not listed</td>
<td>Not listed</td>
</tr>
</tbody>
</table>

Persistence and Degradability

No information available

Bioaccumulation/Accumulation

No information available.

Mobility

No information available.

<table>
<thead>
<tr>
<th>Component</th>
<th>log Pow</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vinyl toluene</td>
<td>3.36</td>
</tr>
</tbody>
</table>

13. Disposal considerations

Waste Disposal Methods

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. Chemical waste generators must also consult local, regional, and national hazardous waste regulations to ensure complete and accurate classification.

14. Transport Information

DOT

<table>
<thead>
<tr>
<th>UN-No</th>
<th>UN2618</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proper Shipping Name</td>
<td>VINYLTOLUENES, STABILIZED</td>
</tr>
<tr>
<td>Hazard Class</td>
<td>3</td>
</tr>
<tr>
<td>Packing Group</td>
<td>III</td>
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</table>

TDG

<table>
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<tr>
<th>UN-No</th>
<th>UN2618</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proper Shipping Name</td>
<td>VINYLTOLUENES, STABILIZED</td>
</tr>
<tr>
<td>Hazard Class</td>
<td>3</td>
</tr>
<tr>
<td>Packing Group</td>
<td>III</td>
</tr>
</tbody>
</table>

IATA

<table>
<thead>
<tr>
<th>UN-No</th>
<th>UN2618</th>
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</thead>
<tbody>
<tr>
<td>Proper Shipping Name</td>
<td>VINYLTOLUENES, STABILIZED</td>
</tr>
<tr>
<td>Hazard Class</td>
<td>3</td>
</tr>
<tr>
<td>Packing Group</td>
<td>III</td>
</tr>
</tbody>
</table>

IMDG/IMO

<table>
<thead>
<tr>
<th>UN-No</th>
<th>UN2618</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proper Shipping Name</td>
<td>VINYLTOLUENES, STABILIZED</td>
</tr>
<tr>
<td>Hazard Class</td>
<td>3</td>
</tr>
<tr>
<td>Packing Group</td>
<td>III</td>
</tr>
</tbody>
</table>

15. Regulatory Information

International Inventories

<table>
<thead>
<tr>
<th>Component</th>
<th>TSCA</th>
<th>DSL</th>
<th>NDSL</th>
<th>EINECS</th>
<th>ELINCS</th>
<th>NLP</th>
<th>PICCS</th>
<th>ENCS</th>
<th>AICS</th>
<th>IECSC</th>
<th>KECL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vinyl toluene</td>
<td>X</td>
<td>X</td>
<td>-</td>
<td>246-562-2</td>
<td>-</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

Legend:

X - Listed
E - Indicates a substance that is the subject of a Section 5(e) Consent order under TSCA.
F - Indicates a substance that is the subject of a Section 5(f) Rule under TSCA.
N - Indicates a polymeric substance containing no free-radical initiator in its inventory name but is considered to cover the designated polymer made with any free-radical initiator regardless of the amount used.
P - Indicates a commenced PMN substance
R - Indicates a substance that is the subject of a Section 6 risk management rule under TSCA.
S - Indicates a substance that is identified in a proposed or final Significant New Use Rule
Vinyltoluene, stabilized with 10 to 15 ppm
p-tert-Butylcatechol

Revision Date 30-May-2017

T - Indicates a substance that is the subject of a Section 4 test rule under TSCA.
XU - Indicates a substance exempt from reporting under the Inventory Update Rule, i.e. Partial Updating of the TSCA Inventory Data Base
Production and Site Reports (40 CFR 710(B)).
Y1 - Indicates an exempt polymer that has a number-average molecular weight of 1,000 or greater.
Y2 - Indicates an exempt polymer that is a polyester and is made only from reactants included in a specified list of low concern reactants that comprises one of the eligibility criteria for the exemption rule.

U.S. Federal Regulations

TSCA 12(b) Not applicable
SARA 313 Not applicable

SARA 311/312 Hazard Categories

<table>
<thead>
<tr>
<th>Hazard Category</th>
<th>Yes/No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute Health Hazard</td>
<td>Yes</td>
</tr>
<tr>
<td>Chronic Health Hazard</td>
<td>No</td>
</tr>
<tr>
<td>Fire Hazard</td>
<td>Yes</td>
</tr>
<tr>
<td>Sudden Release of Pressure Hazard</td>
<td>No</td>
</tr>
<tr>
<td>Reactive Hazard</td>
<td>No</td>
</tr>
</tbody>
</table>

CWA (Clean Water Act) Not applicable

Clean Air Act Not applicable

OSHA Occupational Safety and Health Administration Not applicable

CERCLA Not applicable

California Proposition 65 This product does not contain any Proposition 65 chemicals

U.S. State Right-to-Know Regulations

<table>
<thead>
<tr>
<th>Component</th>
<th>Massachusetts</th>
<th>New Jersey</th>
<th>Pennsylvania</th>
<th>Illinois</th>
<th>Rhode Island</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vinyl toluene</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>-</td>
<td>X</td>
</tr>
</tbody>
</table>

U.S. Department of Transportation

Reportable Quantity (RQ): N
DOT Marine Pollutant N
DOT Severe Marine Pollutant N

U.S. Department of Homeland Security

This product does not contain any DHS chemicals.

Other International Regulations

Mexico - Grade No information available

16. Other Information

Prepared By Regulatory Affairs
Thermo Fisher Scientific
Email: EMSDS.RA@thermofisher.com

Creation Date 23-Feb-2012
Revision Date 30-May-2017
Print Date 30-May-2017
Revision Summary This document has been updated to comply with the US OSHA HazCom 2012 Standard replacing the current legislation under 29 CFR 1910.1200 to align with the Globally
Harmonized System of Classification and Labeling of Chemicals (GHS).

Disclaimer
The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text

End of SDS
SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers
   Product name : Talc

   Product Number : 243604
   Brand : Sigma-Aldrich
   REACH No. : A registration number is not available for this substance as the substance or its uses are exempted from registration, the annual tonnage does not require a registration or the registration is envisaged for a later registration deadline.
   CAS-No. : 14807-96-6

1.2 Relevant identified uses of the substance or mixture and uses advised against
   Identified uses : Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet
   Company : Sigma-Aldrich Chemie GmbH
              Riedstrasse 2
              D-89555 STEINHEIM
   Telephone : +49 89-6513-1444
   Fax : +49 7329-97-2319
   E-mail address : eurtechserv@sial.com

1.4 Emergency telephone number
   Emergency Phone # 0800 181 7059 (CHEMTREC Deutschland)
                      +49 (0)696 43508409 (CHEMTREC weltweit)

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture
   Not a hazardous substance or mixture according to Regulation (EC) No. 1272/2008.

2.2 Label elements
   Not a hazardous substance or mixture according to Regulation (EC) No. 1272/2008.

2.3 Other hazards
   This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

SECTION 3: Composition/information on ingredients

3.1 Substances
   Synonyms : Hydrous magnesium silicate
   Formula : H₂Mg₃O₁₂Si₄
   Molecular weight : 379.27 g/mol
SECTION 4: First aid measures

4.1 Description of first aid measures

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration.

In case of skin contact
Wash off with soap and plenty of water.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11.

4.3 Indication of any immediate medical attention and special treatment needed
No data available

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
Magnesium oxide, silicon oxides

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
No data available

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
Avoid dust formation. Avoid breathing vapours, mist or gas.
For personal protection see section 8.

6.2 Environmental precautions
No special environmental precautions required.

6.3 Methods and materials for containment and cleaning up
Sweep up and shovel. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling
Provide appropriate exhaust ventilation at places where dust is formed.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Store in cool place. Keep container tightly closed in a dry and well-ventilated place.
Storage class (TRGS 510): Non Combustible Solids

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Components with workplace control parameters

8.2 Exposure controls

Appropriate engineering controls
General industrial hygiene practice.

Personal protective equipment

Eye/face protection
Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

The selected protective gloves have to satisfy the specifications of EU Directive 89/686/EEC and the standard EN 374 derived from it.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0,11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0,11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Choose body protection in relation to its type, to the concentration and amount of dangerous substances, and to the specific work-place., The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Respiratory protection is not required. Where protection from nuisance levels of dusts are desired, use type N95 (US) or type P1 (EN 143) dust masks. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
No special environmental precautions required.
SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a) Appearance
   Form: powder
   Colour: light grey

b) Odour
   No data available

c) Odour Threshold
   No data available

d) pH
   No data available

e) Melting point/freezing point
   No data available

f) Initial boiling point and boiling range
   No data available

g) Flash point
   Not applicable

h) Evaporation rate
   No data available

i) Flammability (solid, gas)
   No data available

j) Upper/lower flammability or explosive limits
   No data available

k) Vapour pressure
   No data available

l) Vapour density
   No data available

m) Relative density
   No data available

n) Water solubility
   No data available

o) Partition coefficient: n-octanol/water
   No data available

p) Auto-ignition temperature
   No data available

q) Decomposition temperature
   No data available

r) Viscosity
   No data available

s) Explosive properties
   No data available

t) Oxidizing properties
   No data available

9.2 Other safety information
   No data available

SECTION 10: Stability and reactivity

10.1 Reactivity
   No data available

10.2 Chemical stability
   Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
   No data available

10.4 Conditions to avoid
   No data available

10.5 Incompatible materials
   Oxidizing agents
10.6 Hazardous decomposition products
Other decomposition products - No data available
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
No data available

Skin corrosion/irritation
Skin - Human
Result: Mild skin irritation - 3 h

Serious eye damage/eye irritation
No data available

Respiratory or skin sensitisation
No data available

Germ cell mutagenicity
No data available

Carcinogenicity
Carcinogenicity - Rat - Inhalation
Tumorigenic: Equivocal tumorigenic agent by RTECS criteria. Lungs, Thorax, or Respiration:Tumors.
IARC: 3 - Group 3: Not classifiable as to its carcinogenicity to humans (Hydrous magnesium silicate)
                   3 - Group 3: Not classifiable as to its carcinogenicity to humans (Hydrous magnesium silicate)

Reproductive toxicity
No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

Additional Information
RTECS: WW2710000
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

SECTION 12: Ecological information

12.1 Toxicity
No data available

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
This substance/mixture contains no components considered to be either persistent, bioaccumulative and 
toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.
12.6 Other adverse effects
   No data available

SECTION 13: Disposal considerations
13.1 Waste treatment methods
   Product
   Offer surplus and non-recyclable solutions to a licensed disposal company.
   Contaminated packaging
   Dispose of as unused product.

SECTION 14: Transport information
14.1 UN number
   ADR/RID: -                      IMDG: -                       IATA: -

14.2 UN proper shipping name
   ADR/RID: Not dangerous goods
   IMDG: Not dangerous goods
   IATA: Not dangerous goods

14.3 Transport hazard class(es)
   ADR/RID: -                      IMDG: -                       IATA: -

14.4 Packaging group
   ADR/RID: -                      IMDG: -                       IATA: -

14.5 Environmental hazards
   ADR/RID: no                     IMDG Marine pollutant: no     IATA: no

14.6 Special precautions for user
   No data available

SECTION 15: Regulatory information
   This safety datasheet complies with the requirements of Regulation (EC) No. 453/2010.

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture
   No data available

15.2 Chemical Safety Assessment
   For this product a chemical safety assessment was not carried out

SECTION 16: Other information

Further information
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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.
SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers

Product name: Phenothiazine

Product Number: 88580
Brand: Sigma-Aldrich
REACH No.: A registration number is not available for this substance as the substance or its uses are exempted from registration, the annual tonnage does not require a registration or the registration is envisaged for a later registration deadline.
CAS-No.: 92-84-2

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses: Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet

Company: Sigma-Aldrich Chemie GmbH
Riedstrasse 2
D-89555 STEINHEIM

Telephone: +49 89-6513-1444
Fax: +49 7329-97-2319
E-mail address: eurtechserv@sial.com

1.4 Emergency telephone number

Emergency Phone #: 0800 181 7059 (CHEMTREC Deutschland)
+49 (0)696 43508409 (CHEMTREC weltweit)

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

Classification according to Regulation (EC) No 1272/2008
Acute toxicity, Oral (Category 4), H302
Skin sensitisation (Category 1), H317
Specific target organ toxicity - repeated exposure, Oral (Category 2), Blood, H373
Chronic aquatic toxicity (Category 3), H412

For the full text of the H-Statements mentioned in this Section, see Section 16.

Classification according to EU Directives 67/548/EEC or 1999/45/EC
Xn Harmful R22, R43, R48/22, R52/53

For the full text of the R-phrases mentioned in this Section, see Section 16.

2.2 Label elements

Labelling according Regulation (EC) No 1272/2008

Pictogram:

Signal word: Warning
Hazard statement(s)
H302 Harmful if swallowed.
2.3 Other hazards - none

SECTION 3: Composition/information on ingredients

3.1 Substances

<table>
<thead>
<tr>
<th>Component</th>
<th>Classification</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phenothiazine</td>
<td>Acute Tox. 4; Skin Sens. 1; STOT RE 2; Aquatic Chronic 3; H302, H317, H373, H412</td>
<td>&lt;= 100 %</td>
</tr>
</tbody>
</table>

Hazardous ingredients according to Directive 1999/45/EC

<table>
<thead>
<tr>
<th>Component</th>
<th>Classification</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phenothiazine</td>
<td>Xn, R22 - R43 - R48/22 - R52/53</td>
<td>&lt;= 100 %</td>
</tr>
</tbody>
</table>

For the full text of the H-Statements and R-Phrases mentioned in this Section, see Section 16

SECTION 4: First aid measures

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available
SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
Carbon oxides, nitrogen oxides (NOx), Sulphur oxides

5.3 Advice for firefighters
Wear self contained breathing apparatus for fire fighting if necessary.

5.4 Further information
no data available

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
Use personal protective equipment. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust. For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up
Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid formation of dust and aerosols. Provide appropriate exhaust ventilation at places where dust is formed. For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Store in cool place. Keep container tightly closed in a dry and well-ventilated place.

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Components with workplace control parameters

8.2 Exposure controls

Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).
**Skin protection**  
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove’s outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

The selected protective gloves have to satisfy the specifications of EU Directive 89/686/EEC and the standard EN 374 derived from it.

- **Full contact**
  - Material: Nitrile rubber
  - Minimum layer thickness: 0,11 mm
  - Break through time: 480 min
  - Material tested: Dermatril® (KCL 740 / Aldrich Z677272, Size M)

- **Splash contact**
  - Material: Nitrile rubber
  - Minimum layer thickness: 0,11 mm
  - Break through time: 480 min
  - Material tested: Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374

If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

**Body Protection**
Complete suit protecting against chemicals. The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

**Respiratory protection**
For nuisance exposures use type P95 (US) or type P1 (EU EN 143) particle respirator. For higher level protection use type OV/AG/P99 (US) or type ABEK-P2 (EU EN 143) respirator cartridges. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

**Control of environmental exposure**
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

---

**SECTION 9: Physical and chemical properties**

**9.1 Information on basic physical and chemical properties**

- **a) Appearance**
  - Form: pellets
  - Colour: light yellow

- **b) Odour**
  - odourless

- **c) Odour Threshold**
  - no data available

- **d) pH**
  - 7 at 10 g/l at 20 °C

- **e) Melting point/freezing point**
  - Melting point/range: 182 - 187 °C - lit.
  - Melting point/range: 183 - 187 °C

- **f) Initial boiling point and boiling range**
  - 371 °C - lit.

- **g) Flash point**
  - no data available

- **h) Evaporation rate**
  - no data available

- **i) Flammability (solid, gas)**
  - The product is not flammable. - Flammability (solids)

- **j) Upper/lower**
  - no data available
SECTION 10: Stability and reactivity

10.1 Reactivity
no data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
no data available

10.4 Conditions to avoid
no data available

10.5 Incompatible materials
Strong oxidizing agents

10.6 Hazardous decomposition products
Other decomposition products - no data available
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - rat - male and female - 1.370 mg/kg
LD50 Dermal - rat - male and female - > 2.000 mg/kg
(OECD Test Guideline 402)

Skin corrosion/irritation
Skin - rabbit
Result: No skin irritation - 4 h
(OECD Test Guideline 404)

Serious eye damage/eye irritation
Eyes - rabbit
Result: No eye irritation
(OECD Test Guideline 405)
Respiratory or skin sensitisation
Causes photosensitivity. Exposure to light can result in allergic reactions resulting in dermatologic lesions, which can vary from sunburnlike responses to edematous, vesiculated lesions, or bullae

Maximisation Test - guinea pig
May cause sensitisation by skin contact.
(OECD Test Guideline 406)

Germ cell mutagenicity
Ames test
S. typhimurium
Result: negative

rat - male
Result: negative

Carcinogenicity
IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

Reproductive toxicity
Reproductive toxicity - rat - Oral
Effects on Fertility: Post-implantation mortality (e.g., dead and/or resorbed implants per total number of implants).

Specific target organ toxicity - single exposure
no data available

Specific target organ toxicity - repeated exposure
Oral - May cause damage to organs through prolonged or repeated exposure. - Blood

Aspiration hazard
no data available

Additional Information
RTECS: SN5075000
anemia, Discoloration of the skin.

SECTION 12: Ecological information

12.1 Toxicity
Toxicity to fish static test LC50 - Oncorhynchus mykiss (rainbow trout) - 70.7 mg/l - 96 h (OECD Test Guideline 203)

Toxicity to daphnia and other aquatic invertebrates static test EC50 - Daphnia magna (Water flea) - 11.92 mg/l - 48 h (OECD Test Guideline 202)

Toxicity to algae static test EC50 - Desmodesmus subspicatus (green algae) - > 100 mg/l - 72 h (OECD Test Guideline 201)

Toxicity to bacteria Respiration inhibition IC50 - Sludge Treatment - > 100 mg/l - 3 h (OECD Test Guideline 209)

12.2 Persistence and degradability
Biodegradability aerobic
Result: 0 % - Not readily biodegradable.
(OECD Test Guideline 301D)

Chemical Oxygen Demand (COD) 2.337 mg/g

12.3 Bioaccumulative potential
Bioaccumulation Cyprinus carpio (Carp) - 56 d
at 25 °C - 0,02 mg/l
Bioconcentration factor (BCF): 127 - 660

12.4 Mobility in soil
no data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects
Harmful to aquatic life with long lasting effects.
Additional ecological information no data available
Dissolved organic carbon (DOC) 8 mg/g

SECTION 13: Disposal considerations

13.1 Waste treatment methods
Product
Offer surplus and non-recyclable solutions to a licensed disposal company. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Contaminated packaging
Dispose of as unused product.

SECTION 14: Transport information

14.1 UN number
ADR/RID: - IMDG: - IATA: -

14.2 UN proper shipping name
ADR/RID: Not dangerous goods IMDG: Not dangerous goods IATA: Not dangerous goods

14.3 Transport hazard class(es)
ADR/RID: - IMDG: - IATA: -

14.4 Packaging group
ADR/RID: - IMDG: - IATA: -

14.5 Environmental hazards
ADR/RID: no IMDG Marine pollutant: no IATA: no

14.6 Special precautions for user
no data available

SECTION 15: Regulatory information

This safety datasheet complies with the requirements of Regulation (EC) No. 1907/2006.

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture
no data available

15.2 Chemical Safety Assessment
For this product a chemical safety assessment was not carried out

SECTION 16: Other information

Full text of H-Statements referred to under sections 2 and 3.
Acute Tox.          Acute toxicity
Aquatic Chronic   Chronic aquatic toxicity
H302              Harmful if swallowed.
H317              May cause an allergic skin reaction.
H373              May cause damage to organs through prolonged or repeated exposure if swallowed.
H412              Harmful to aquatic life with long lasting effects.
Skin Sens.        Skin sensitisation
STOT RE           Specific target organ toxicity - repeated exposure

Full text of R-phrases referred to under sections 2 and 3

Xn                Harmful
R22               Harmful if swallowed.
R43               May cause sensitisation by skin contact.
R48/22            Harmful: danger of serious damage to health by prolonged exposure if swallowed.
R52/53            Harmful to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

Further information
Copyright 2014 Sigma-Aldrich Co. LLC. License granted to make unlimited paper copies for internal use only.
The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.
SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers
Product name: Tetraethylthiuram disulfide

Product Number: 86720
Brand: Aldrich
Index-No.: 006-079-00-8
REACH No.: A registration number is not available for this substance as the substance or its uses are exempted from registration, the annual tonnage does not require a registration or the registration is envisaged for a later registration deadline.
CAS-No.: 97-77-8

1.2 Relevant identified uses of the substance or mixture and uses advised against
Identified uses: Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet
Company: Sigma-Aldrich Chemie GmbH
Riedstrasse 2
D-89555 STEINHEIM

Telephone: +49 89-6513-1444
Fax: +49 7329-97-2319
E-mail address: eurtechserv@sial.com

1.4 Emergency telephone number
Emergency Phone #: 0800 181 7059 (CHEMTREC Deutschland)
+49 (0)696 43508409 (CHEMTREC weltweit)

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture
Classification according to Regulation (EC) No 1272/2008
Acute toxicity, Oral (Category 4), H302
Skin sensitisation (Category 1), H317
Specific target organ toxicity - repeated exposure (Category 2), H373
Acute aquatic toxicity (Category 1), H400
Chronic aquatic toxicity (Category 1), H410

For the full text of the H-Statements mentioned in this Section, see Section 16.

Classification according to EU Directives 67/548/EEC or 1999/45/EC
Xn: Harmful
   R22, R48/22
   R43
N: Dangerous for the environment
   R50/53

For the full text of the R-phrases mentioned in this Section, see Section 16.

2.2 Label elements
Labelling according Regulation (EC) No 1272/2008
Pictogram
Signal word: Warning

Hazard statement(s)
H302  Harmful if swallowed.
H317  May cause an allergic skin reaction.
H373  May cause damage to organs through prolonged or repeated exposure.
H410  Very toxic to aquatic life with long lasting effects.

Precautionary statement(s)
P273  Avoid release to the environment.
P280  Wear protective gloves.
P501  Dispose of contents/container to an approved waste disposal plant.

Supplemental Hazard Statements: none

2.3 Other hazards - none

SECTION 3: Composition/information on ingredients

3.1 Substances

Synonyms:
- Bis(diethylthiocarbamyl) disulfide
- Disulfiram
- Bis(diethylthiocarbamoyl) disulfide

Formula: \( \text{C}_{10}\text{H}_{20}\text{N}_{2}\text{S}_{4} \)
Molecular Weight: 296.54 g/mol
CAS-No.: 97-77-8
EC-No.: 202-607-8
Index-No.: 006-079-00-8

Hazardous ingredients according to Regulation (EC) No 1272/2008

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<tr>
<th>Component</th>
<th>Classification</th>
<th>Concentration</th>
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<tr>
<td>Tetraethylthiuramdisulfide</td>
<td>Acute Tox. 4; Skin Sens. 1; STOT RE 2; Aquatic Acute 1; Aquatic Chronic 1; H302, H317, H373, H410</td>
<td>-</td>
</tr>
</tbody>
</table>

Hazardous ingredients according to Directive 1999/45/EC

<table>
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<tr>
<th>Component</th>
<th>Classification</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tetraethylthiuramdisulfide</td>
<td>Xn, N, R22 - R43 - R48/22 - R50/53</td>
<td>-</td>
</tr>
</tbody>
</table>

For the full text of the H-Statements and R-Phrases mentioned in this Section, see Section 16

SECTION 4: First aid measures

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.
4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
no data available

SECTION 5: Firefighting measures

5.1 Extinguishing media
Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
Carbon oxides, nitrogen oxides (NOx), Sulphur oxides

5.3 Advice for firefighters
Wear self contained breathing apparatus for fire fighting if necessary.

5.4 Further information
no data available

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
Use personal protective equipment. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust. For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up
Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid formation of dust and aerosols. Provide appropriate exhaust ventilation at places where dust is formed. For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Store in cool place. Keep container tightly closed in a dry and well-ventilated place.

7.3 Specific end use(s)
A part from the uses mentioned in section 1.2 no other specific uses are stipulated

SECTION 8: Exposure controls/personal protection

8.1 Control parameters
Components with workplace control parameters

8.2 Exposure controls
Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.
Personal protective equipment

Eye/face protection
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove’s outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

The selected protective gloves have to satisfy the specifications of EU Directive 89/686/EEC and the standard EN 374 derived from it.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0,11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0,11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
For nuisance exposures use type P95 (US) or type P1 (EU EN 143) particle respirator. For higher level protection use type OV/AG/P99 (US) or type ABEK-P2 (EU EN 143) respirator cartridges. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

<p>| | |</p>
<table>
<thead>
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<tbody>
<tr>
<td>a)</td>
<td>Appearance</td>
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<td></td>
<td>Form: powder</td>
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<td></td>
<td>Colour: beige</td>
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<tr>
<td>b)</td>
<td>Odour</td>
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<td></td>
<td>no data available</td>
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<tr>
<td>c)</td>
<td>Odour Threshold</td>
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<tr>
<td>d)</td>
<td>pH</td>
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<tr>
<td>e)</td>
<td>Melting point/freezing point</td>
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<td></td>
<td>Melting point/range: 69 - 71 °C</td>
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<tr>
<td>f)</td>
<td>Initial boiling point and boiling range</td>
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<tr>
<td></td>
<td>117 °C at 23 hPa</td>
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<tr>
<td>g)</td>
<td>Flash point</td>
</tr>
<tr>
<td></td>
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</tr>
</tbody>
</table>
h) Evaporation rate: no data available
i) Flammability (solid, gas): no data available
j) Upper/lower flammability or explosive limits: no data available
k) Vapour pressure: no data available
l) Vapour density: no data available
m) Relative density: 1.3 g/cm³
n) Water solubility: 0.004 g/l at 25 °C
o) Partition coefficient: n-octanol/water: log Pow: 5
p) Auto-ignition temperature: no data available
q) Decomposition temperature: no data available
r) Viscosity: no data available
s) Explosive properties: no data available
t) Oxidizing properties: no data available

9.2 Other safety information
Bulk density: 340 - 380 kg/m³ at 20 °C

SECTION 10: Stability and reactivity

10.1 Reactivity
no data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
no data available

10.4 Conditions to avoid
no data available

10.5 Incompatible materials
Strong oxidizing agents

10.6 Hazardous decomposition products
Other decomposition products - no data available
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
LD₅₀ Oral - rabbit - 1.800 mg/kg

LD₅₀ Oral - mouse - 1.980 mg/kg

LD₅₀ Intraperitoneal - rat - 248 mg/kg

LD₅₀ Intraperitoneal - mouse - 75 mg/kg
LD50 Subcutaneous - mouse - 2.600 mg/kg

**Skin corrosion/irritation**
no data available

**Serious eye damage/eye irritation**
Eyes - rabbit
Result: No eye irritation
(OECD Test Guideline 405)

**Respiratory or skin sensitisation**
no data available

**Germ cell mutagenicity**
Hamster
ovary
Sister chromatid exchange

Hamster
Embryo
Morphological transformation.

Chicken
Embryo
Other mutation test systems

mouse
Embryo
DNA inhibition

mouse
lymphocyte

Chicken
Embryo
DNA inhibition

mouse
Sister chromatid exchange

rat
Morphological transformation.

**Carcinogenicity**
This product is or contains a component that is not classifiable as to its carcinogenicity based on its IARC, ACGIH, NTP, or EPA classification.

IARC: 3 - Group 3: Not classifiable as to its carcinogenicity to humans (Tetraethylthiuramdisulfide)

**Reproductive toxicity**
no data available

**Specific target organ toxicity - single exposure**
no data available

**Specific target organ toxicity - repeated exposure**
May cause damage to organs through prolonged or repeated exposure.

**Aspiration hazard**
no data available

**Additional Information**
RTECS: JO1225000
A serious toxic interaction has been observed in rats fed tetraethylthiuram (antabuse, ro-sulphiram) and then exposed to vapors of 1,2-dibromoethane., May cause nervous system disturbances., Lethargy., Ataxia., Seizures., Coma., thyroid enlargement

SECTION 12: Ecological information

12.1 Toxicity
Toxicity to fish
LC50 - Poecilia reticulata (guppy) - 0.187 mg/l - 96 h
(OECD Test Guideline 203)
Toxicity to daphnia and other aquatic invertebrates
LC50 - Daphnia magna (Water flea) - 0.12 mg/l - 48 h
Toxicity to algae
Growth inhibition EC50 - Chlorella pyrenoidosa - 1.8 mg/l - 96 h

12.2 Persistence and degradability
no data available

12.3 Bioaccumulative potential
no data available

12.4 Mobility in soil
no data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects
Very toxic to aquatic life with long lasting effects.

SECTION 13: Disposal considerations

13.1 Waste treatment methods
Product
Offer surplus and non-recyclable solutions to a licensed disposal company. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Contaminated packaging
Dispose of as unused product.

SECTION 14: Transport information

14.1 UN number
ADR/RID: 3077
IMDG: 3077
IATA: 3077

14.2 UN proper shipping name
ADR/RID: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S.
(Tetraethylthiuramdisulfide)
IMDG: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S.
(Tetraethylthiuramdisulfide)
IATA: Environmentally hazardous substance, solid, n.o.s. (Tetraethylthiuramdisulfide)

14.3 Transport hazard class(es)
ADR/RID: 9
IMDG: 9
IATA: 9

14.4 Packaging group
ADR/RID: III
IMDG: III
IATA: III

14.5 Environmental hazards
ADR/RID: yes
IMDG Marine pollutant: yes
IATA: yes

14.6 Special precautions for user

Further information
SECTION 15: Regulatory information

This safety datasheet complies with the requirements of Regulation (EC) No. 1907/2006.

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture
no data available

15.2 Chemical Safety Assessment
For this product a chemical safety assessment was not carried out

SECTION 16: Other information

Full text of H-Statements referred to under sections 2 and 3.
Acute Tox.  Acute toxicity
Aquatic Acute  Acute aquatic toxicity
Aquatic Chronic  Chronic aquatic toxicity
H302  Harmful if swallowed.
H317  May cause an allergic skin reaction.
H373  May cause damage to organs through prolonged or repeated exposure.
H400  Very toxic to aquatic life.
H410  Very toxic to aquatic life with long lasting effects.
Skin Sens.  Skin sensitisation

Full text of R-phrases referred to under sections 2 and 3
N  Dangerous for the environment
Xn  Harmful
R22  Harmful if swallowed.
R43  May cause sensitisation by skin contact.
R48/22  Harmful: danger of serious damage to health by prolonged exposure if swallowed.
R50/53  Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

Further information
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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.
SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers
Product name: Tetraethylthiuram disulfide

Product Number: 86720
Brand: Aldrich
Index-No.: 006-079-00-8
REACH No.: A registration number is not available for this substance as the substance or its uses are exempted from registration, the annual tonnage does not require a registration or the registration is envisaged for a later registration deadline.
CAS-No.: 97-77-8

1.2 Relevant identified uses of the substance or mixture and uses advised against
Identified uses: Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet
Company: Sigma-Aldrich Chemie GmbH
Riedstrasse 2
D-89555 STEINHEIM

Telephone: +49 89-6513-1444
Fax: +49 7329-97-2319
E-mail address: eurtechserv@sial.com

1.4 Emergency telephone number
Emergency Phone #: 0800 181 7059 (CHEMTREC Deutschland)
+49 (0)696 43508409 (CHEMTREC weltweit)

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture
Classification according to Regulation (EC) No 1272/2008
Acute toxicity, Oral (Category 4), H302
Skin sensitisation (Category 1), H317
Specific target organ toxicity - repeated exposure (Category 2), H373
Acute aquatic toxicity (Category 1), H400
Chronic aquatic toxicity (Category 1), H410

For the full text of the H-Statements mentioned in this Section, see Section 16.

Classification according to EU Directives 67/548/EEC or 1999/45/EC
Xn Harmful R22, R48/22
R43
N Dangerous for the environment R50/53

For the full text of the R-phrases mentioned in this Section, see Section 16.

2.2 Label elements
Labelling according Regulation (EC) No 1272/2008
Pictogram
Signal word       Warning
Hazard statement(s)  
H302       Harmful if swallowed.
H317       May cause an allergic skin reaction.
H373       May cause damage to organs through prolonged or repeated exposure.
H410       Very toxic to aquatic life with long lasting effects.
Precautionary statement(s)  
P273       Avoid release to the environment.
P280       Wear protective gloves.
P501       Dispose of contents/ container to an approved waste disposal plant.
Supplemental Hazard Statements  
none

2.3 Other hazards - none

SECTION 3: Composition/information on ingredients

3.1 Substances
Synonyms       : Bis(diethylthiocarbamyl) disulfide
                 Disulfiram
                 Bis(diethylthiocarbamoyl) disulfide

Formula       : C_{10}H_{20}N_{2}S_{4}
Molecular Weight : 296,54 g/mol
CAS-No.       : 97-77-8
EC-No.        : 202-607-8
Index-No.     : 006-079-00-8

Hazardous ingredients according to Regulation (EC) No 1272/2008

<table>
<thead>
<tr>
<th>Component</th>
<th>Classification</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tetraethylthiuramdisulfide</td>
<td>Acute Tox. 4; Skin Sens. 1; STOT RE 2; Aquatic Acute 1; Aquatic Chronic 1; H302, H317, H373, H410</td>
<td>-</td>
</tr>
</tbody>
</table>

Hazardous ingredients according to Directive 1999/45/EC

<table>
<thead>
<tr>
<th>Component</th>
<th>Classification</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tetraethylthiuramdisulfide</td>
<td>Xn, N, R22 - R43 - R48/22 - R50/53</td>
<td>-</td>
</tr>
</tbody>
</table>

For the full text of the H-Statements and R-Phrases mentioned in this Section, see Section 16

SECTION 4: First aid measures

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.
4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in
section 11

4.3 Indication of any immediate medical attention and special treatment needed
no data available

SECTION 5: Firefighting measures
5.1 Extinguishing media
Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
Carbon oxides, nitrogen oxides (NOx), Sulphur oxides

5.3 Advice for firefighters
Wear self contained breathing apparatus for fire fighting if necessary.

5.4 Further information
no data available

SECTION 6: Accidental release measures
6.1 Personal precautions, protective equipment and emergency procedures
Use personal protective equipment. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure
adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust.
For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the
environment must be avoided.

6.3 Methods and materials for containment and cleaning up
Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed
containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

SECTION 7: Handling and storage
7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid formation of dust and aerosols.
Provide appropriate exhaust ventilation at places where dust is formed.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Store in cool place. Keep container tightly closed in a dry and well-ventilated place.

7.3 Specific end use(s)
A part from the uses mentioned in section 1.2 no other specific uses are stipulated

SECTION 8: Exposure controls/personal protection
8.1 Control parameters
Components with workplace control parameters

8.2 Exposure controls
Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and
at the end of workday.
Personal protective equipment

Eye/face protection
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove’s outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

The selected protective gloves have to satisfy the specifications of EU Directive 89/686/EEC and the standard EN 374 derived from it.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0,11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0,11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de,
test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Complete suit protecting against chemicals. The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
For nuisance exposures use type P95 (US) or type P1 (EU EN 143) particle respirator. For higher level protection use type OVP/P99 (US) or type ABEK-P2 (EU EN 143) respirator cartridges. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Appearance</td>
<td>Form: powder</td>
</tr>
<tr>
<td>Colour: beige</td>
<td></td>
</tr>
<tr>
<td>b) Odour</td>
<td>no data available</td>
</tr>
<tr>
<td>c) Odour Threshold</td>
<td>no data available</td>
</tr>
<tr>
<td>d) pH</td>
<td>no data available</td>
</tr>
<tr>
<td>e) Melting point/freezing point</td>
<td>Melting point/range: 69 - 71 °C</td>
</tr>
<tr>
<td>f) Initial boiling point and boiling range</td>
<td>117 °C at 23 hPa</td>
</tr>
<tr>
<td>g) Flash point</td>
<td>no data available</td>
</tr>
</tbody>
</table>
h) Evaporation rate  no data available
i) Flammability (solid, gas) no data available
j) Upper/lower flammability or explosive limits no data available
k) Vapour pressure  no data available
l) Vapour density  no data available
m) Relative density  1.3 g/cm³
n) Water solubility  0.004 g/l at 25 °C
o) Partition coefficient: n-octanol/water  log Pow: 5
p) Auto-ignition temperature  no data available
q) Decomposition temperature  no data available
r) Viscosity  no data available
s) Explosive properties  no data available
t) Oxidizing properties  no data available

9.2 Other safety information
Bulk density  340 - 380 kg/m³ at 20 °C

SECTION 10: Stability and reactivity

10.1 Reactivity
no data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
no data available

10.4 Conditions to avoid
no data available

10.5 Incompatible materials
Strong oxidizing agents

10.6 Hazardous decomposition products
Other decomposition products - no data available
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - rabbit - 1.800 mg/kg

LD50 Oral - mouse - 1.980 mg/kg

LD50 Intraperitoneal - rat - 248 mg/kg

LD50 Intraperitoneal - mouse - 75 mg/kg
LD50 Subcutaneous - mouse - 2.600 mg/kg

**Skin corrosion/irritation**
no data available

**Serious eye damage/eye irritation**
Eyes - rabbit
Result: No eye irritation
(OECD Test Guideline 405)

**Respiratory or skin sensitisation**
no data available

**Germ cell mutagenicity**
Hamster
ovary
Sister chromatid exchange

Hamster
Embryo
Morphological transformation.

Chicken
Embryo
Other mutation test systems

mouse
Embryo
DNA inhibition

mouse
lymphocyte

Chicken
Embryo
DNA inhibition

mouse
Sister chromatid exchange

rat
Morphological transformation.

**Carcinogenicity**
This product is or contains a component that is not classifiable as to its carcinogenicity based on its IARC, ACGIH, NTP, or EPA classification.

IARC:  3 - Group 3: Not classifiable as to its carcinogenicity to humans (Tetraethylthiuramdisulfide)

**Reproductive toxicity**
no data available

**Specific target organ toxicity - single exposure**
no data available

**Specific target organ toxicity - repeated exposure**
May cause damage to organs through prolonged or repeated exposure.

**Aspiration hazard**
no data available

**Additional Information**
RTECS: JO1225000
SECTION 12: Ecological information

12.1 Toxicity
Toxicity to fish
- LC50 - Poecilia reticulata (guppy) - 0,187 mg/l - 96 h (OECD Test Guideline 203)
Toxicity to daphnia and other aquatic invertebrates
- LC50 - Daphnia magna (Water flea) - 0,12 mg/l - 48 h
Toxicity to algae
- Growth inhibition EC50 - Chlorella pyrenoidosa - 1,8 mg/l - 96 h

12.2 Persistence and degradability
no data available

12.3 Bioaccumulative potential
no data available

12.4 Mobility in soil
no data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not required/not conducted

12.6 Other adverse effects
Very toxic to aquatic life with long lasting effects.

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product
Offer surplus and non-recyclable solutions to a licensed disposal company. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Contaminated packaging
Dispose of as unused product.

SECTION 14: Transport information

14.1 UN number
ADR/RID: 3077  
IMDG: 3077  
IATA: 3077

14.2 UN proper shipping name
ADR/RID: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (Tetraethylthiuramdisulfide)  
IMDG: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (Tetraethylthiuramdisulfide)  
IATA: Environmentally hazardous substance, solid, n.o.s. (Tetraethylthiuramdisulfide)

14.3 Transport hazard class(es)
ADR/RID: 9  
IMDG: 9  
IATA: 9

14.4 Packaging group
ADR/RID: III  
IMDG: III  
IATA: III

14.5 Environmental hazards
ADR/RID: yes  
IMDG Marine pollutant: yes  
IATA: yes

14.6 Special precautions for user

Further information
SECTION 15: Regulatory information

This safety datasheet complies with the requirements of Regulation (EC) No. 1907/2006.

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture

no data available

15.2 Chemical Safety Assessment

For this product a chemical safety assessment was not carried out

SECTION 16: Other information

Full text of H-Statements referred to under sections 2 and 3.

Acute Tox.  Acute toxicity
Aquatic Acute  Acute aquatic toxicity
Aquatic Chronic  Chronic aquatic toxicity
H302  Harmful if swallowed.
H317  May cause an allergic skin reaction.
H373  May cause damage to organs through prolonged or repeated exposure.
H400  Very toxic to aquatic life.
H410  Very toxic to aquatic life with long lasting effects.
Skin Sens.  Skin sensitisation

Full text of R-phrases referred to under sections 2 and 3

N  Dangerous for the environment
Xn  Harmful
R22  Harmful if swallowed.
R43  May cause sensitisation by skin contact.
R48/22  Harmful: danger of serious damage to health by prolonged exposure if swallowed.
R50/53  Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

Further information

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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.
SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers

Product name: Antimony(III) oxide

Product Number: 202649
Brand: Aldrich
Index-No.: 051-005-00-X
REACH No.: A registration number is not available for this substance as the substance or its uses are exempted from registration, the annual tonnage does not require a registration or the registration is envisaged for a later registration deadline.

CAS-No.: 1309-64-4

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses: Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet

Company: Sigma-Aldrich Chemie GmbH
Riedstrasse 2
D-89555 STEINHEIM

Telephone: +49 89-6513-1444
Fax: +49 7329-97-2319
E-mail address: eurtechserv@zial.com

1.4 Emergency telephone number

Emergency Phone #: 0800 181 7059 (CHEMTREC Deutschland)
+49 (0)696 43508409 (CHEMTREC weltweit)

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

Classification according to Regulation (EC) No 1272/2008
Carcinogenicity (Category 2), H351

For the full text of the H-Statements mentioned in this Section, see Section 16.

Classification according to EU Directives 67/548/EEC or 1999/45/EC
R40

For the full text of the R-phrases mentioned in this Section, see Section 16.

2.2 Label elements

Labelling according Regulation (EC) No 1272/2008
Pictogram

Signal word: Warning

Hazard statement(s):
H351 Suspected of causing cancer.
SECTION 3: Composition/information on ingredients

3.1 Substances
Formula: \( \text{O}_3\text{Sb}_2 \)
Molecular Weight: 291.52 g/mol
CAS-No.: 1309-64-4
EC-No.: 215-175-0
Index-No.: 051-005-00-X

Hazardous ingredients according to Regulation (EC) No 1272/2008

<table>
<thead>
<tr>
<th>Component</th>
<th>Classification</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Antimony trioxide</td>
<td>Carc. 2; H351</td>
<td>&lt;= 100 %</td>
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</tbody>
</table>

Hazardous ingredients according to Directive 1999/45/EC

<table>
<thead>
<tr>
<th>Component</th>
<th>Classification</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Antimony trioxide</td>
<td>Xn, Carc.Cat.3, R40</td>
<td>&lt;= 100 %</td>
</tr>
</tbody>
</table>

For the full text of the H-Statements and R-Phrases mentioned in this Section, see Section 16

SECTION 4: First aid measures

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
no data available
SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
Antimony oxide

5.3 Advice for firefighters
Wear self contained breathing apparatus for fire fighting if necessary.

5.4 Further information
no data available

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
Use personal protective equipment. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust. For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up
Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid formation of dust and aerosols. Provide appropriate exhaust ventilation at places where dust is formed. For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Store in cool place. Keep container tightly closed in a dry and well-ventilated place.

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Components with workplace control parameters

8.2 Exposure controls

Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection
Safety glasses with side-shields conforming to EN166 Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).
**Skin protection**
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

The selected protective gloves have to satisfy the specifications of EU Directive 89/686/EEC and the standard EN 374 derived from it.

**Full contact**
Material: Nitrile rubber
Minimum layer thickness: 0,11 mm
Break through time: 480 min
Material tested: Dermatril® (KCL 740 / Aldrich Z677272, Size M)

**Splash contact**
Material: Nitrile rubber
Minimum layer thickness: 0,11 mm
Break through time: 480 min
Material tested: Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de,
test method: EN374

If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

**Body Protection**
impervious clothing. The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

**Respiratory protection**
Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

**Control of environmental exposure**
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

---

**SECTION 9: Physical and chemical properties**

### 9.1 Information on basic physical and chemical properties

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>a)</td>
<td>Appearance</td>
</tr>
<tr>
<td>b)</td>
<td>Odour</td>
</tr>
<tr>
<td>c)</td>
<td>Odour Threshold</td>
</tr>
<tr>
<td>d)</td>
<td>pH</td>
</tr>
<tr>
<td>e)</td>
<td>Melting point/freezing point</td>
</tr>
<tr>
<td>f)</td>
<td>Initial boiling point and boiling range</td>
</tr>
<tr>
<td>g)</td>
<td>Flash point</td>
</tr>
<tr>
<td>h)</td>
<td>Evaporation rate</td>
</tr>
<tr>
<td>i)</td>
<td>Flammability (solid, gas)</td>
</tr>
<tr>
<td>j)</td>
<td>Upper/lower</td>
</tr>
</tbody>
</table>
9.2 Other safety information
no data available

SECTION 10: Stability and reactivity

10.1 Reactivity
no data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
no data available

10.4 Conditions to avoid
no data available

10.5 Incompatible materials
Strong reducing agents, Strong oxidizing agents

10.6 Hazardous decomposition products
Other decomposition products - no data available
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
LD₅₀ Oral - rat - > 34.600 mg/kg

Skin corrosion/irritation
no data available

Serious eye damage/eye irritation
Eyes - rabbit
Result: Mild eye irritation
(Draize Test)

Respiratory or skin sensitisation
Maximisation Test - guinea pig
Result: Does not cause skin sensitisation.
(OECD Test Guideline 406)
Germ cell mutagenicity
no data available

Carcinogenicity
Carcinogenicity - rat - Inhalation
Tumorigenic:Carcinogenic by RTECS criteria. Lungs, Thorax, or Respiration:Tumors. Liver:Tumors.
Limited evidence of carcinogenicity in animal studies

IARC: 2B - Group 2B: Possibly carcinogenic to humans (Antimony trioxide)

Reproductive toxicity
Reproductive toxicity - rat - Inhalation
Effects on Fertility: Post-implantation mortality (e.g., dead and/or resorbed implants per total number of implants). Effects on Embryo or Fetus: Fetal death.

Specific target organ toxicity - single exposure
no data available

Specific target organ toxicity - repeated exposure
no data available

Aspiration hazard
no data available

Additional Information
RTECS: CC5650000
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

SECTION 12: Ecological information

12.1 Toxicity
Toxicity to fish mortality LC50 - Danio rerio (zebra fish) - > 1.000 mg/l - 96 h (OECD Test Guideline 203)
Toxicity to daphnia and other aquatic invertebrates Immobilization EC50 - Daphnia magna (Water flea) - > 1.000 mg/l - 48 h (OECD Test Guideline 202)
Toxicity to algae Growth inhibition EC50 - Selenastrum capricornutum (green algae) - 67 mg/l - 72 h (OECD Test Guideline 201)

12.2 Persistence and degradability
no data available

12.3 Bioaccumulative potential
no data available

12.4 Mobility in soil
no data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects
Harmful to aquatic life with long lasting effects.
no data available
SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product
Offer surplus and non-recyclable solutions to a licensed disposal company. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Contaminated packaging
Dispose of as unused product.

SECTION 14: Transport information

14.1 UN number
ADR/RID: - IMDG: - IATA: -

14.2 UN proper shipping name
ADR/RID: Not dangerous goods
IMDG: Not dangerous goods
IATA: Not dangerous goods

14.3 Transport hazard class(es)
ADR/RID: - IMDG: - IATA: -

14.4 Packaging group
ADR/RID: - IMDG: - IATA: -

14.5 Environmental hazards
ADR/RID: no IMDG Marine pollutant: no IATA: no

14.6 Special precautions for user
no data available

SECTION 15: Regulatory information

This safety datasheet complies with the requirements of Regulation (EC) No. 1907/2006.

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture
no data available

15.2 Chemical Safety Assessment
For this product a chemical safety assessment was not carried out

SECTION 16: Other information

Full text of H-statements referred to under sections 2 and 3.
Carc. Carcinogenicity
H351 Suspected of causing cancer.

Full text of R-phrases referred to under sections 2 and 3
Xn Harmful
R40 Limited evidence of a carcinogenic effect.

Further information
Copyright 2014 Sigma-Aldrich Co. LLC. License granted to make unlimited paper copies for internal use only.
The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.
SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers
Product name: 4-tert-Butylcatechol

Product Number: 19670
Brand: Aldrich
REACH No.: A registration number is not available for this substance as the substance or its uses are exempted from registration, the annual tonnage does not require a registration or the registration is envisaged for a later registration deadline.
CAS-No.: 98-29-3

1.2 Relevant identified uses of the substance or mixture and uses advised against
Identified uses: Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet
Company: Sigma-Aldrich Chemie GmbH
Riedstrasse 2
D-89555 STEINHEIM

Telephone: +49 89-6513-1444
Fax: +49 7329-97-2319
E-mail address: eurtechserv@sial.com

1.4 Emergency telephone number
Emergency Phone #: 0800 181 7059 (CHEMTREC Deutschland)
+49 (0)696 43508409 (CHEMTREC weltweit)

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture
Classification according to Regulation (EC) No 1272/2008
Acute toxicity, Oral (Category 4), H302
Acute toxicity, Dermal (Category 4), H312
Skin corrosion (Category 1B), H314
Skin sensitisation (Category 1), H317
Acute aquatic toxicity (Category 1), H400
Chronic aquatic toxicity (Category 1), H410

For the full text of the H-Statements mentioned in this Section, see Section 16.

Classification according to EU Directives 67/548/EEC or 1999/45/EC
C, N Corrosive, Dangerous for the environment R21/22, R34, R43, R50/53

For the full text of the R-phrases mentioned in this Section, see Section 16.

2.2 Label elements
Labelling according Regulation (EC) No 1272/2008
Pictogram

\[\text{SIGMA-ALDRICH}\]
\[\text{SAFETY DATA SHEET}\]
\[\text{according to Regulation (EC) No. 1907/2006}\]
\[\text{Version 5.1 Revision Date 30.06.2014}\]
\[\text{Print Date 16.09.2017}\]
\[\text{GENERIC EU MSDS - NO COUNTRY SPECIFIC DATA - NO OEL DATA}\]
2.3 Other hazards - none

SECTION 3: Composition/information on ingredients

3.1 Substances

<table>
<thead>
<tr>
<th>Formula</th>
<th>C_{10}H_{14}O_{2}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Molecular Weight</td>
<td>166.22 g/mol</td>
</tr>
<tr>
<td>CAS-No.</td>
<td>98-29-3</td>
</tr>
<tr>
<td>EC-No.</td>
<td>202-653-9</td>
</tr>
</tbody>
</table>

Hazardous ingredients according to Regulation (EC) No 1272/2008

<table>
<thead>
<tr>
<th>Component</th>
<th>Classification</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>4-tert-Butylpyrocatechol</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CAS-No.</td>
<td>98-29-3</td>
<td></td>
</tr>
<tr>
<td>EC-No.</td>
<td>202-653-9</td>
<td>&lt;= 100 %</td>
</tr>
</tbody>
</table>

Hazardous ingredients according to Directive 1999/45/EC

<table>
<thead>
<tr>
<th>Component</th>
<th>Classification</th>
<th>Concentration</th>
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<td></td>
</tr>
<tr>
<td>EC-No.</td>
<td>202-653-9</td>
<td>&lt;= 100 %</td>
</tr>
</tbody>
</table>

For the full text of the H-Statements and R-Phrases mentioned in this Section, see Section 16

SECTION 4: First aid measures

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Take off contaminated clothing and shoes immediately. Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.
If swallowed
Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
no data available

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
Carbon oxides

5.3 Advice for firefighters
Wear self contained breathing apparatus for fire fighting if necessary.

5.4 Further information
no data available

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
Use personal protective equipment. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust.
For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up
Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid formation of dust and aerosols.
Provide appropriate exhaust ventilation at places where dust is formed.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Store in cool place. Keep container tightly closed in a dry and well-ventilated place.

hygroscopic

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated
SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Components with workplace control parameters

8.2 Exposure controls

Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection
Face shield and safety glasses. Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove’s outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

The selected protective gloves have to satisfy the specifications of EU Directive 89/686/EEC and the standard EN 374 derived from it.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0,11 mm
Break through time: 480 min
Material tested: Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0,11 mm
Break through time: 480 min
Material tested: Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Complete suit protecting against chemicals. The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.
SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties
a) Appearance
   Form: flakes
   Colour: white
b) Odour
   phenol-like
c) Odour Threshold
   no data available
d) pH
   no data available
e) Melting point/freezing point
   Melting point/range: 53 - 56 °C
   Melting point/range: 52 - 55 °C - lit.
f) Initial boiling point and boiling range
   285 °C - lit.
g) Flash point
   113 °C - closed cup
h) Evaporation rate
   no data available
i) Flammability (solid, gas)
   The product is not flammable. - Flammability (solids)
j) Upper/lower flammability or explosive limits
   no data available
k) Vapour pressure
   0,001 - 0,011 hPa at 30,35 - 50,15 °C
l) Vapour density
   no data available
m) Relative density
   1,08 kg/m3 at 20 °C
n) Water solubility
   4,2 g/l at 20 °C - OECD Test Guideline 105 - soluble
o) Partition coefficient: n-octanol/water
   log Pow: 1,98 at 25 °C
p) Auto-ignition temperature
   435 °C at 996 - 1.000 hPa
q) Decomposition temperature
   no data available
r) Viscosity
   no data available
s) Explosive properties
   Not explosive
t) Oxidizing properties
   no data available

9.2 Other safety information
no data available

SECTION 10: Stability and reactivity

10.1 Reactivity
no data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
no data available

10.4 Conditions to avoid
Avoid moisture.

10.5 Incompatible materials
Strong oxidizing agents
10.6 **Hazardous decomposition products**
Other decomposition products - no data available
In the event of fire: see section 5

**SECTION 11: Toxicological information**

**11.1 Information on toxicological effects**

**Acute toxicity**
LD50 Oral - rat - male and female - 815 mg/kg
(OECD Test Guideline 401)

LD50 Dermal - rat - male and female - 1.331 mg/kg
(OECD Test Guideline 402)

**Skin corrosion/irritation**
Skin - rabbit
Result: Corrosive - 4 h
(OECD Test Guideline 404)

**Serious eye damage/eye irritation**
Eyes - rabbit
Result: Corrosive
(OECD Test Guideline 405)

**Respiratory or skin sensitisation**
Maximisation Test - guinea pig
Result: May cause sensitisation by skin contact.
(OECD Test Guideline 406)

**Germ cell mutagenicity**
Ames test
S. typhimurium
Result: negative

Mutagenicity (micronucleus test)
mouse - male and female
Result: negative

**Carcinogenicity**
IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

**Reproductive toxicity**
no data available

**Specific target organ toxicity - single exposure**
no data available

**Specific target organ toxicity - repeated exposure**
no data available

**Aspiration hazard**
no data available

**Additional Information**
Repeated dose toxicity - rat - male and female - Oral - No observed adverse effect level - < 70 mg/kg
RTECS: UX1400000
Cough, Shortness of breath, Headache, Nausea, Vomiting

**SECTION 12: Ecological information**

**12.1 Toxicity**
Toxicity to fish semi-static test LC50 - Danio rerio (zebra fish) - 0.12 mg/l - 96 h
Toxicity to daphnia and other aquatic invertebrates
semistatic test EC50 - Daphnia magna (Water flea) - 0.48 mg/l - 48 h
(OECD Test Guideline 202)

Toxicity to algae
static test EC50 - Pseudokirchneriella subcapitata - 10.17 mg/l - 72 h
(OECD Test Guideline 201)

Toxicity to bacteria
Respiration inhibition EC50 - Sludge Treatment - 16 mg/l - 3 h
(OECD Test Guideline 209)

12.2 Persistence and degradability
Biodegradability
aerobic - Exposure time 28 d
Result: 24.7% - Not readily biodegradable.
(OECD Test Guideline 310)

12.3 Bioaccumulative potential
no data available

12.4 Mobility in soil
no data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects
Very toxic to aquatic life with long lasting effects.

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product
Offer surplus and non-recyclable solutions to a licensed disposal company. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Contaminated packaging
Dispose of as unused product.

SECTION 14: Transport information

14.1 UN number
ADR/RID: 3261 IMDG: 3261 IATA: 3261

14.2 UN proper shipping name
ADR/RID: CORROSIVE SOLID, ACIDIC, ORGANIC, N.O.S. (4-tert-Butylpyrocatechol)
IMDG: CORROSIVE SOLID, ACIDIC, ORGANIC, N.O.S. (4-tert-Butylpyrocatechol)
IATA: Corrosive solid, acidic, organic, n.o.s. (4-tert-Butylpyrocatechol)

14.3 Transport hazard class(es)
ADR/RID: 8 IMDG: 8 IATA: 8

14.4 Packaging group
ADR/RID: II IMDG: II IATA: II

14.5 Environmental hazards
ADR/RID: yes IMDG Marine pollutant: yes IATA: no

14.6 Special precautions for user
no data available

SECTION 15: Regulatory information

This safety datasheet complies with the requirements of Regulation (EC) No. 1907/2006.

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture
no data available
15.2 Chemical Safety Assessment
For this product a chemical safety assessment was not carried out

SECTION 16: Other information

Full text of H-statements referred to under sections 2 and 3.

| Acute Tox. | Acute toxicity |
| Aquatic Acute | Acute aquatic toxicity |
| Aquatic Chronic | Chronic aquatic toxicity |
| H302 | Harmful if swallowed. |
| H302 + H312 | Harmful if swallowed or in contact with skin |
| H312 | Harmful in contact with skin. |
| H314 | Causes severe skin burns and eye damage. |
| H317 | May cause an allergic skin reaction. |
| H400 | Very toxic to aquatic life. |

Full text of R-phrases referred to under sections 2 and 3

| C | Corrosive |
| N | Dangerous for the environment |
| R21/22 | Harmful in contact with skin and if swallowed. |
| R34 | Causes burns. |
| R43 | May cause sensitisation by skin contact. |
| R50/53 | Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment. |

Further information
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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.
SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers
   Product name : Triethanolamine

   Product Number : 90279
   Brand : Sigma
   REACH No. : A registration number is not available for this substance as the substance or its uses are exempted from registration, the annual tonnage does not require a registration or the registration is envisaged for a later registration deadline.
   CAS-No. : 102-71-6

1.2 Relevant identified uses of the substance or mixture and uses advised against
   Identified uses : Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet
   Company : Sigma-Aldrich Chemie GmbH
             Riedstrasse 2
             D-89555 STEINHEIM
   Telephone : +49 89-6513-1444
   Fax : +49 7329-97-2319
   E-mail address : eurtechserv@sial.com

1.4 Emergency telephone number
   Emergency Phone # 0800 181 7059 (CHEMTREC Deutschland)
                        +49 (0)696 43508409 (CHEMTREC weltweit)

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture
   Not a hazardous substance or mixture according to Regulation (EC) No. 1272/2008.

2.2 Label elements
   Not a hazardous substance or mixture according to Regulation (EC) No. 1272/2008.

2.3 Other hazards
   This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

SECTION 3: Composition/information on ingredients

3.1 Substances
   Synonyms : 2,2',2"-NitrilotriethanolTris(2-hydroxyethyl)amine
   Formula : C₆H₁₅NO₃
   Molecular weight : 149.19 g/mol
SECTION 4: First aid measures

4.1 Description of first aid measures

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration.

In case of skin contact
Wash off with soap and plenty of water.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
No data available

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
No data available

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
Avoid breathing vapours, mist or gas.
For personal protection see section 8.

6.2 Environmental precautions
No special environmental precautions required.

6.3 Methods and materials for containment and cleaning up
Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Keep container tightly closed in a dry and well-ventilated place. Store in cool place.
hygroscopic

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

SECTION 8: Exposure controls/personal protection

8.1 Control parameters
Components with workplace control parameters

8.2 Exposure controls
Appropriate engineering controls
General industrial hygiene practice.

Personal protective equipment

Eye/face protection
Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

The selected protective gloves have to satisfy the specifications of EU Directive 89/686/EEC and the standard EN 374 derived from it.

Full contact
Material: Nature latex/chloroprene
Minimum layer thickness: 0,6 mm
Break through time: 480 min
Material tested:Lapren® (KCL 706 / Aldrich Z677558, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0,2 mm
Break through time: 30 min
Material tested:Dermatril® P (KCL 743 / Aldrich Z677388, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Impervious clothing, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Respiratory protection not required. For nuisance exposures use type OV/AG (US) or type ABEK (EU EN 14387) respirator cartridges. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
No special environmental precautions required.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties
a) Appearance Form: viscous
Colour: colourless

b) Odour No data available
c) Odour Threshold No data available
d) pH 10.5 - 11.5 at 149 g/l at 25 °C
e) Melting point/freezing point Melting point/range: 17.9 - 21 °C
f) Initial boiling point and boiling range 190 - 193 °C at 7 hPa
g) Flash point 179 °C - closed cup
h) Evaporation rate No data available
i) Flammability (solid, gas) No data available
j) Upper/lower flammability or explosive limits
   Upper explosion limit: 8.5 % (V)
   Lower explosion limit: 1.3 % (V)
k) Vapour pressure No data available
l) Vapour density 5.15 - (Air = 1.0)
m) Relative density 1.124 g/mL at 25 °C
n) Water solubility 149 g/l at 20 °C - completely soluble
o) Partition coefficient: n-octanol/water No data available
p) Auto-ignition temperature No data available
q) Decomposition temperature No data available
r) Viscosity No data available
s) Explosive properties No data available
t) Oxidizing properties No data available

9.2 Other safety information
Relative vapour density 5.15 - (Air = 1.0)

SECTION 10: Stability and reactivity

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
Air Exposure to moisture Light.

10.5 Incompatible materials
Acids, Oxidizing agents

10.6 Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Carbon oxides, Nitrogen oxides (NOx)
Other decomposition products - No data available
In the event of fire: see section 5
SECTION 11: Toxicological information

11.1 Information on toxicological effects

**Acute toxicity**
LD50 Dermal - Rabbit - > 22.5 g/kg

**Skin corrosion/irritation**
No data available

**Serious eye damage/eye irritation**
No data available

**Respiratory or skin sensitisation**
No data available

**Germ cell mutagenicity**
No data available

**Carcinogenicity**
IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

**Reproductive toxicity**
No data available

**Specific target organ toxicity - single exposure**
No data available

**Specific target organ toxicity - repeated exposure**
No data available

**Aspiration hazard**
No data available

**Additional Information**
RTECS: KL9275000
Kidney injury may occur., Dermatitis
Liver - Irregularities - Based on Human Evidence

SECTION 12: Ecological information

12.1 Toxicity
Toxicity to daphnia and other aquatic invertebrates
EC50 - Daphnia (water flea) - 609.98 mg/l - 48 h

12.2 Persistence and degradability
Biodegradability Result: 96 % - Readily biodegradable.

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

12.6 Other adverse effects
No data available
SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product
Offer surplus and non-recyclable solutions to a licensed disposal company.

Contaminated packaging
Dispose of as unused product.

SECTION 14: Transport information

14.1 UN number
ADR/RID: - IMDG: - IATA: -

14.2 UN proper shipping name
ADR/RID: Not dangerous goods
IMDG: Not dangerous goods
IATA: Not dangerous goods

14.3 Transport hazard class(es)
ADR/RID: - IMDG: - IATA: -

14.4 Packaging group
ADR/RID: - IMDG: - IATA: -

14.5 Environmental hazards
ADR/RID: no IMDG Marine pollutant: no IATA: no

14.6 Special precautions for user
No data available

SECTION 15: Regulatory information

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture
This safety datasheet complies with the requirements of Regulation (EC) No. 1907/2006.

15.2 Chemical safety assessment
For this product a chemical safety assessment was not carried out

SECTION 16: Other information

Further information
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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.
SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers
   Product name: Sodium tripolyphosphate
   Product Number: 238503
   Brand: Sigma-Aldrich
   REACH No.: A registration number is not available for this substance as the substance or its uses are exempted from registration, the annual tonnage does not require a registration or the registration is envisaged for a later registration deadline.
   CAS-No.: 7758-29-4

1.2 Relevant identified uses of the substance or mixture and uses advised against
   Identified uses: Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet
   Company: Sigma-Aldrich Chemie GmbH
            Riedstrasse 2
            D-89555 STEINHEIM
   Telephone: +49 89-6513-1444
   Fax: +49 7329-97-2319
   E-mail address: eurtechserv@sial.com

1.4 Emergency telephone number
   Emergency Phone #: 0800 181 7059 (CHEMTREC Deutschland)
                     +49 (0)696 43508409 (CHEMTREC weltweit)

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture
   Not a hazardous substance or mixture according to Regulation (EC) No. 1272/2008.
   This substance is not classified as dangerous according to Directive 67/548/EEC.

2.2 Label elements
   The product does not need to be labelled in accordance with EC directives or respective national laws.

2.3 Other hazards - none

SECTION 3: Composition/information on ingredients

3.1 Substances
   Synonyms: Sodium triphosphate pentabasic
              Sodium tripolyphosphate pentabasic
              Pentasodium tripolyphosphate Anhydrous
              STPP
              Sodium triphosphate
   Formula: Na₅O₁₀P₃
   Molecular Weight: 367.86 g/mol
   CAS-No.: 7758-29-4
SECTION 4: First aid measures

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
no data available

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
Oxides of phosphorus, Sodium oxides

5.3 Advice for firefighters
Wear self contained breathing apparatus for fire fighting if necessary.

5.4 Further information
no data available

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
Use personal protective equipment. Avoid dust formation. Avoid breathing vapours, mist or gas. Avoid breathing dust.
For personal protection see section 8.

6.2 Environmental precautions
Do not let product enter drains.

6.3 Methods and materials for containment and cleaning up
Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling
Provide appropriate exhaust ventilation at places where dust is formed.
For precautions see section 2.2.
7.2 **Conditions for safe storage, including any incompatibilities**
Store in cool place. Keep container tightly closed in a dry and well-ventilated place. hygroscopic

7.3 **Specific end use(s)**
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

---

**SECTION 8: Exposure controls/personal protection**

8.1 **Control parameters**

Components with workplace control parameters

8.2 **Exposure controls**

**Appropriate engineering controls**
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

**Personal protective equipment**

**Eye/face protection**
Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

**Skin protection**
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove’s outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

The selected protective gloves have to satisfy the specifications of EU Directive 89/686/EEC and the standard EN 374 derived from it.

**Full contact**
Material: Nitrile rubber
Minimum layer thickness: 0,11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

**Splash contact**
Material: Nitrile rubber
Minimum layer thickness: 0,11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

**Body Protection**
Choose body protection in relation to its type, to the concentration and amount of dangerous substances, and to the specific work-place. The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

**Respiratory protection**
Respiratory protection is not required. Where protection from nuisance levels of dusts are desired, use type N95 (US) or type P1 (EN 143) dust masks. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

**Control of environmental exposure**
Do not let product enter drains.
SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a) Appearance
   Form: granules
   Colour: white

b) Odour
   no data available

c) Odour Threshold
   no data available

d) pH
   9.5 - 10.3 at 1 g/l

e) Melting point/freezing point
   Melting point/range: 622 °C

f) Initial boiling point and boiling range
   no data available

g) Flash point
   not applicable

h) Evaporation rate
   no data available

i) Flammability (solid, gas)
   no data available

j) Upper/lower flammability or explosive limits
   no data available

k) Vapour pressure
   no data available

l) Vapour density
   no data available

m) Relative density
   no data available

n) Water solubility
   148 g/l at 20 °C - completely soluble

o) Partition coefficient: n-octanol/water
   no data available

p) Auto-ignition temperature
   no data available

q) Decomposition temperature
   no data available

r) Viscosity
   no data available

s) Explosive properties
   no data available

t) Oxidizing properties
   no data available

9.2 Other safety information

   Dissociation constant 9.52 at 25 °C

SECTION 10: Stability and reactivity

10.1 Reactivity
   no data available

10.2 Chemical stability
   Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
   no data available

10.4 Conditions to avoid
   Avoid moisture.

10.5 Incompatible materials
   Strong acids, Strong oxidizing agents
10.6 Hazardous decomposition products
Other decomposition products - no data available
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - rat - male and female - > 2.000 mg/kg
(OECD Test Guideline 401)
LC50 Inhalation - rat - male and female - 4 h - > 0.39 mg/l
LD50 Dermal - rabbit - 4.640 mg/kg

Skin corrosion/irritation
Skin - rabbit
Result: No skin irritation
(OECD Test Guideline 404)

Serious eye damage/eye irritation
Eyes - rabbit
Result: No eye irritation
(OECD Test Guideline 405)

Respiratory or skin sensitisation
in vivo assay - mouse
Result: Did not cause sensitisation on laboratory animals.
(OECD Test Guideline 429)

Germ cell mutagenicity
in vitro assay
S. typhimurium
Result: negative

Carcinogenicity
IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

Reproductive toxicity
no data available

Specific target organ toxicity - single exposure
no data available

Specific target organ toxicity - repeated exposure
no data available

Aspiration hazard
no data available

Additional Information
RTECS: YK4570000
Gastrointestinal disturbance, To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

SECTION 12: Ecological information

12.1 Toxicity
Toxicity to daphnia and EC50 - Daphnia magna (Water flea) - > 100 mg/l - 48 h
other aquatic invertebrates

12.2 Persistence and degradability
no data available

12.3 Bioaccumulative potential
no data available

12.4 Mobility in soil
no data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects
no data available

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product
Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber. Offer surplus and non-recyclable solutions to a licensed disposal company.

Contaminated packaging
Dispose of as unused product.

SECTION 14: Transport information

14.1 UN number
ADR/RID: - IMDG: - IATA: -

14.2 UN proper shipping name
ADR/RID: Not dangerous goods IMDG: Not dangerous goods IATA: Not dangerous goods

14.3 Transport hazard class(es)
ADR/RID: - IMDG: - IATA: -

14.4 Packaging group
ADR/RID: - IMDG: - IATA: -

14.5 Environmental hazards
ADR/RID: no IMDG Marine pollutant: no IATA: no

14.6 Special precautions for user
no data available

SECTION 15: Regulatory information
This safety datasheet complies with the requirements of Regulation (EC) No. 1907/2006.

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture
no data available

15.2 Chemical Safety Assessment
For this product a chemical safety assessment was not carried out
SECTION 16: Other information

Further information
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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.
SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers
   Product name : Zeolite
   Product Number : 96096
   Brand : Sigma
   REACH No. : A registration number is not available for this substance as the substance or its uses are exempted from registration, the annual tonnage does not require a registration or the registration is envisaged for a later registration deadline.
   CAS-No. : 1318-02-1

1.2 Relevant identified uses of the substance or mixture and uses advised against
   Identified uses : Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet
   Company : Sigma-Aldrich Chemie GmbH
   Riedstrasse 2
   D-89555 STEINHEIM
   Telephone : +49 89-6513-1444
   Fax : +49 7329-97-2319
   E-mail address : eurtechserv@sal.com

1.4 Emergency telephone number
   Emergency Phone # : 0800 181 7059 (CHEMTREC Deutschland)
   +49 (0)696 43508409 (CHEMTREC weltweit)

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture
   Not a hazardous substance or mixture according to Regulation (EC) No. 1272/2008.

2.2 Label elements

2.3 Other hazards
   This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

SECTION 3: Composition/information on ingredients

3.1 Substances
   CAS-No. : 1318-02-1
   EC-No. : 215-283-8

   No components need to be disclosed according to the applicable regulations.
SECTION 4: First aid measures

4.1 Description of first aid measures

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration.

In case of skin contact
Wash off with soap and plenty of water.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
No data available

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
No data available

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
Avoid dust formation. Avoid breathing vapours, mist or gas.
For personal protection see section 8.

6.2 Environmental precautions
No special environmental precautions required.

6.3 Methods and materials for containment and cleaning up
Sweep up and shovel. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling
Provide appropriate exhaust ventilation at places where dust is formed.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Store in cool place. Keep container tightly closed in a dry and well-ventilated place.
hygroscopic
7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

SECTION 8: Exposure controls/personal protection

8.1 Control parameters
Components with workplace control parameters

8.2 Exposure controls
Appropriate engineering controls
General industrial hygiene practice.

Personal protective equipment

Eye/face protection
Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

The selected protective gloves have to satisfy the specifications of EU Directive 89/686/EEC and the standard EN 374 derived from it.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0,11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0,11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Choose body protection in relation to its type, to the concentration and amount of dangerous substances, and to the specific work-place., The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Respiratory protection is not required. Where protection from nuisance levels of dusts are desired, use type N95 (US) or type P1 (EN 143) dust masks. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
No special environmental precautions required.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a) Appearance Form: solid
b) Odour: No data available

c) Odour Threshold: No data available

d) pH: No data available

e) Melting point/freezing point: No data available

f) Initial boiling point and boiling range: No data available

g) Flash point: Not applicable

h) Evaporation rate: No data available

i) Flammability (solid, gas): No data available

j) Upper/lower flammability or explosive limits: No data available

k) Vapour pressure: No data available

l) Vapour density: No data available

m) Relative density: No data available

n) Water solubility: No data available

o) Partition coefficient: n-octanol/water: No data available

p) Auto-ignition temperature: No data available

q) Decomposition temperature: No data available

r) Viscosity: No data available

s) Explosive properties: No data available

t) Oxidizing properties: No data available

9.2 Other safety information
No data available

SECTION 10: Stability and reactivity

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
Avoid moisture.

10.5 Incompatible materials
Strong acids, Strong bases, Hydrogen fluoride, Chlorine trifluoride, Ethylene oxide, Halogenated hydrocarbon, Oxygen difluoride, Sodium nitrate, Vinyl compounds

10.6 Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Nature of decomposition products not known. 
Other decomposition products - No data available
In the event of fire: see section 5
SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - > 10.000 mg/kg
LC50 Inhalation - Rat - 4 h - > 5.300 mg/m3
LD50 Dermal - Rabbit - > 2.000 mg/kg

Skin corrosion/irritation
Skin - Human
Result: No skin irritation

Serious eye damage/eye irritation
Eyes - Rabbit
Result: No eye irritation

Respiratory or skin sensitisation
No data available

Germ cell mutagenicity
Human
lymphocyte
Cytogenetic analysis

Mouse
Cytogenetic analysis

Carcinogenicity
This product is or contains a component that is not classifiable as to its carcinogenicity based on its IARC, ACGIH, NTP, or EPA classification.

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

Reproductive toxicity
No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

Additional Information
RTECS: ZG6800000
prolonged or repeated exposure can cause.; Damage to the lungs.
Cough, Difficulty in breathing, Gastrointestinal disturbance, prolonged or repeated exposure can cause.;
Damage to the lungs., To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

SECTION 12: Ecological information

12.1 Toxicity
No data available

12.2 Persistence and degradability
No data available
12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

12.6 Other adverse effects
No data available

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product
Offer surplus and non-recyclable solutions to a licensed disposal company.

Contaminated packaging
Dispose of as unused product.

SECTION 14: Transport information

14.1 UN number
ADR/RID: - IMDG: - IATA: -

14.2 UN proper shipping name
ADR/RID: Not dangerous goods IMDG: Not dangerous goods IATA: Not dangerous goods

14.3 Transport hazard class(es)
ADR/RID: - IMDG: - IATA: -

14.4 Packaging group
ADR/RID: - IMDG: - IATA: -

14.5 Environmental hazards
ADR/RID: no IMDG Marine pollutant: no IATA: no

14.6 Special precautions for user
No data available

SECTION 15: Regulatory information

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture
This safety datasheet complies with the requirements of Regulation (EC) No. 1907/2006.

15.2 Chemical safety assessment
For this product a chemical safety assessment was not carried out

SECTION 16: Other information

Further information
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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.
SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers
   Product name: Manganese(IV) oxide

   Product Number: 529664
   Brand: Aldrich
   Index-No.: 025-001-00-3
   REACH No.: A registration number is not available for this substance as the substance or its uses are exempted from registration, the annual tonnage does not require a registration or the registration is envisaged for a later registration deadline.
   CAS-No.: 1313-13-9

1.2 Relevant identified uses of the substance or mixture and uses advised against
   Identified uses: Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet
   Company: Sigma-Aldrich Chemie GmbH
   Riedstrasse 2
   D-89555 STEINHEIM
   Telephone: +49 89-6513-1444
   Fax: +49 7329-97-2319
   E-mail address: eurtechserv@sial.com

1.4 Emergency telephone number
   Emergency Phone #: 0800 181 7059 (CHEMTREC Deutschland)
   +49 (0)696 43508409 (CHEMTREC weltweit)

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture
   Classification according to Regulation (EC) No 1272/2008
   Acute toxicity, Oral (Category 4), H302
   Acute toxicity, Inhalation (Category 4), H332

   For the full text of the H-Statements mentioned in this Section, see Section 16.

   Classification according to EU Directives 67/548/EEC or 1999/45/EC
   Xn Harmful R20/22

   For the full text of the R-phrases mentioned in this Section, see Section 16.

2.2 Label elements
   Labelling according Regulation (EC) No 1272/2008
   Pictogram

   Signal word: Warning
   Hazard statement(s): H302 + H332 Harmful if swallowed or if inhaled
Precautionary statement(s) none
Supplemental Hazard none

2.3 Other hazards
This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

SECTION 3: Composition/information on ingredients

3.1 Substances
Synonyms: Manganese dioxide
Formula: MnO₂
Molecular weight: 86.94 g/mol
CAS-No.: 1313-13-9
EC-No.: 215-202-6
Index-No.: 025-001-00-3

Hazardous ingredients according to Regulation (EC) No 1272/2008

<table>
<thead>
<tr>
<th>Component</th>
<th>Classification</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manganese dioxide</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CAS-No.</td>
<td>1313-13-9</td>
<td>Acute Tox. 4; H302 + H332</td>
</tr>
<tr>
<td>EC-No.</td>
<td>215-202-6</td>
<td></td>
</tr>
<tr>
<td>Index-No.</td>
<td>025-001-00-3</td>
<td></td>
</tr>
</tbody>
</table>

Hazardous ingredients according to Directive 1999/45/EC

<table>
<thead>
<tr>
<th>Component</th>
<th>Classification</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manganese dioxide</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CAS-No.</td>
<td>1313-13-9</td>
<td>Xn, R20/22</td>
</tr>
<tr>
<td>EC-No.</td>
<td>215-202-6</td>
<td></td>
</tr>
<tr>
<td>Index-No.</td>
<td>025-001-00-3</td>
<td></td>
</tr>
</tbody>
</table>

For the full text of the H-Statements and R-Phrases mentioned in this Section, see Section 16

SECTION 4: First aid measures

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available
SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
Manganese/manganese oxides

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
No data available

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
Use personal protective equipment. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Avoid breathing dust.
For personal protection see section 8.

6.2 Environmental precautions
Do not let product enter drains.

6.3 Methods and materials for containment and cleaning up
Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid formation of dust and aerosols.
Provide appropriate exhaust ventilation at places where dust is formed.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Store in cool place. Keep container tightly closed in a dry and well-ventilated place.
Storage class (TRGS 510): Non Combustible Solids

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

SECTION 8: Exposure controls/personal protection

8.1 Control parameters
Components with workplace control parameters

8.2 Exposure controls
Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection
Safety glasses with side-shields conforming to EN166. Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).
Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove’s outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

The selected protective gloves have to satisfy the specifications of EU Directive 89/686/EEC and the standard EN 374 derived from it.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0,11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0,11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
For nuisance exposures use type P95 (US) or type P1 (EU EN 143) particle respirator. For higher level protection use type OV/AG/P99 (US) or type ABEK-P2 (EU EN 143) respirator cartridges. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Do not let product enter drains.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
</table>
a) Appearance | Form: powder |
b) Odour | No data available |
c) Odour Threshold | No data available |
d) pH | No data available |
e) Melting point/freezing point | Melting point/range: 535 °C - dec. |
f) Initial boiling point and boiling range | No data available |
g) Flash point | No data available |
h) Evaporation rate | No data available |
i) Flammability (solid, gas) | No data available |
j) Upper/lower flammability or explosive limits | No data available |
k) Vapour pressure No data available
l) Vapour density No data available
m) Relative density 5,026 g/cm³
n) Water solubility No data available
o) Partition coefficient: n-octanol/water No data available
p) Auto-ignition temperature No data available
q) Decomposition temperature No data available
r) Viscosity No data available
s) Explosive properties No data available
t) Oxidizing properties No data available

9.2 Other safety information
No data available

SECTION 10: Stability and reactivity

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
No data available

10.5 Incompatible materials
Strong acids, Strong reducing agents, Organic materials

10.6 Hazardous decomposition products
Other decomposition products - No data available
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
No data available

Skin corrosion/irritation
No data available

Serious eye damage/eye irritation
No data available

Respiratory or skin sensitisation
No data available

Germ cell mutagenicity
No data available

Carcinogenicity
IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.
Reproductive toxicity
No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

Additional Information
RTECS: OP0350000

Men exposed to manganese dusts showed a decrease in fertility. Chronic manganese poisoning primarily involves the central nervous system. Early symptoms include languor, sleepiness and weakness in the legs. A stolid mask-like appearance of the face, emotional disturbances such as uncontrollable laughter and a spastic gait with tendency to fall in walking are findings in more advanced cases. High incidence of pneumonia has been found in workers exposed to the dust or fume of some manganese compounds. To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Liver - Irregularities - Based on Human Evidence

SECTION 12: Ecological information

12.1 Toxicity
No data available

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

12.6 Other adverse effects
No data available

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product
Offer surplus and non-recyclable solutions to a licensed disposal company. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Contaminated packaging
Dispose of as unused product.

SECTION 14: Transport information

14.1 UN number
ADR/RID: - IMDG: - IATA: -

14.2 UN proper shipping name
ADR/RID: Not dangerous goods IMDG: Not dangerous goods IATA: Not dangerous goods
14.3 Transport hazard class(es)  
ADR/RID: -  
IMDG: -  
IATA: -  

14.4 Packaging group  
ADR/RID: -  
IMDG: -  
IATA: -  

14.5 Environmental hazards  
ADR/RID: no  
IMDG Marine pollutant: no  
IATA: no  

14.6 Special precautions for user  
No data available  

SECTION 15: Regulatory information  
This safety datasheet complies with the requirements of Regulation (EC) No. 1907/2006.  

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture  
No data available  

15.2 Chemical Safety Assessment  
For this product a chemical safety assessment was not carried out  

SECTION 16: Other information  
Full text of H-Statements referred to under sections 2 and 3.  
Acute Tox.  
H302  
H302 + H332  
H332  
Acute toxicity  
Harmful if swallowed.  
Harmful if swallowed or if inhaled  
Harmful if inhaled.  

Full text of R-phrases referred to under sections 2 and 3  
Xn  
R20/22  
Harmful  
Harmful by inhalation and if swallowed.  

Further information  
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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.
1. IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING

1.1 Product identifiers
Product name: Zinc oxide
Product Number: 251607
Brand: Sigma-Aldrich
Index-No.: 030-013-00-7
CAS-No.: 1314-13-2

1.2 Relevant identified uses of the substance or mixture and uses advised against
Identified uses: Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet
Company: Sigma-Aldrich Chemie GmbH
Riedstrasse 2
D-89555 STEINHEIM
Telephone: +49 89-6513-1444
Fax: +49 7329-97-2319
E-mail address: eurtechserv@sial.com

1.4 Emergency telephone number
Emergency Phone #: 0800 181 7059 (CHEMTREC Deutschland)
+49 (0)696 43508409 (CHEMTREC weltweit)

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture
Classification according to Regulation (EC) No 1272/2008 [EU-GHS/CLP]
Acute aquatic toxicity (Category 1)
Chronic aquatic toxicity (Category 1)

Classification according to EU Directives 67/548/EEC or 1999/45/EC
Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

2.2 Label elements
Labelling according Regulation (EC) No 1272/2008 [CLP]
Pictogram

Signal word: Warning
Hazard statement(s)
H410 Very toxic to aquatic life with long lasting effects.

Precautionary statement(s)
P273 Avoid release to the environment.
P501 Dispose of contents/container to an approved waste disposal plant.

Supplemental Hazard Statements: none

Hazard symbol(s)
R-phrase(s)
R50/53 Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

S-phrase(s)
S60 This material and its container must be disposed of as hazardous waste.
S61 Avoid release to the environment. Refer to special instructions/ Safety data sheets.

2.3 Other hazards - none

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

<table>
<thead>
<tr>
<th>Component</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zinc oxide</td>
<td></td>
</tr>
<tr>
<td>CAS-No.</td>
<td>1314-13-2</td>
</tr>
<tr>
<td>EC-No.</td>
<td>215-222-5</td>
</tr>
<tr>
<td>Index-No.</td>
<td>030-013-00-7</td>
</tr>
</tbody>
</table>

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
Zinc oxide dust or fume can irritate the respiratory tract. Prolonged skin contact can produce a severe dermatitis called oxide pox. Exposure to high levels of dust or fume can cause metallic taste, marked thirst, coughing, fatigue, weakness, muscular pain, and nausea followed by fever and chills. Severe overexposure may result in bronchitis or pneumonia with a bluish tint to the skin., prolonged or repeated exposure can cause:, Reversible liver enzyme abnormalities,, Diarrhoea

4.3 Indication of any immediate medical attention and special treatment needed
no data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
Zinc/zinc oxides

5.3 Advice for firefighters
Wear self contained breathing apparatus for fire fighting if necessary.

5.4 Further information
no data available
6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures
Use personal protective equipment. Avoid dust formation. Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up
Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid formation of dust and aerosols. Provide appropriate exhaust ventilation at places where dust is formed.

7.2 Conditions for safe storage, including any incompatibilities
Store in cool place. Keep container tightly closed in a dry and well-ventilated place.

7.3 Specific end uses
no data available

8. EXPOSURE CONTROLS/PERSOAL PROTECTION

8.1 Control parameters
Components with workplace control parameters

8.2 Exposure controls
Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection
Safety glasses with side-shields conforming to EN166 Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

The selected protective gloves have to satisfy the specifications of EU Directive 89/686/EEC and the standard EN 374 derived from it.

Immersion protection
Material: Nitrile rubber
Minimum layer thickness: 0,11 mm
Break through time: > 480 min
Material tested:Dermatril® (Aldrich Z677272, Size M)

Splash protection
Material: Nitrile rubber
Minimum layer thickness: 0,11 mm
Break through time: > 30 min
Material tested:Dermatril® (Aldrich Z677272, Size M)
Body Protection
Impervious clothing. The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
For nuisance exposures use type P95 (US) or type P1 (EU EN 143) particle respirator. For higher level protection use type OV/AG/P99 (US) or type ABEK-P2 (EU EN 143) respirator cartridges. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a) Appearance  Form: powder
Color: white
b) Odour  no data available
c) Odour Threshold  no data available
d) pH  no data available
e) Melting point/freezing point  no data available
f) Initial boiling point and boiling range  no data available
g) Flash point  not applicable
h) Evaporation rate  no data available
i) Flammability (solid, gas)  no data available
j) Upper/lower flammability or explosive limits  no data available
k) Vapour pressure  no data available
l) Vapour density  no data available
m) Relative density  5,610 g/cm³
n) Water solubility  no data available
o) Partition coefficient: n-octanol/water  no data available
p) Autoignition temperature  no data available
q) Decomposition temperature  no data available
r) Viscosity  no data available
s) Explosive properties  no data available
t) Oxidizing properties  no data available

9.2 Other safety information
no data available
10. STABILITY AND REACTIVITY

10.1 Reactivity
no data available

10.2 Chemical stability
no data available

10.3 Possibility of hazardous reactions
no data available

10.4 Conditions to avoid
no data available

10.5 Incompatible materials
Strong oxidizing agents

10.6 Hazardous decomposition products
Other decomposition products - no data available

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - mouse - 7.950 mg/kg
LC50 Inhalation - mouse - 2.500 mg/m3

Skin corrosion/irritation
Skin - rabbit - Mild skin irritation - 24 h

Serious eye damage/eye irritation
Eyes - rabbit - Mild eye irritation - 24 h
Eyes - rabbit - Mild eye irritation - 24 h

Respiratory or skin sensitization
no data available

Germ cell mutagenicity
Genotoxicity in vitro - Hamster - Embryo
Unscheduled DNA synthesis
Genotoxicity in vitro - Hamster - Embryo
Morphological transformation.
Genotoxicity in vitro - Hamster - Embryo
Sister chromatid exchange
Genotoxicity in vivo - guinea pig - Inhalation
Unscheduled DNA synthesis

Carcinogenicity
IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

Reproductive toxicity
Developmental Toxicity - rat - Oral
Specific Developmental Abnormalities: Homeostasis Effects on Newborn: Stillbirth. Effects on Newborn: Growth statistics (e.g., reduced weight gain).

Specific target organ toxicity - single exposure
no data available

Specific target organ toxicity - repeated exposure
no data available
Aspiration hazard
no data available

Potential health effects

Inhalation May be harmful if inhaled. May cause respiratory tract irritation.
Ingestion May be harmful if swallowed.
Skin May be harmful if absorbed through skin. May cause skin irritation.
Eyes Causes eye irritation.

Signs and Symptoms of Exposure
Zinc oxide dust or fume can irritate the respiratory tract. Prolonged skin contact can produce a severe dermatitis called oxide pox. Exposure to high levels of dust or fume can cause metallic taste, marked thirst, coughing, fatigue, weakness, muscular pain, and nausea followed by fever and chills. Severe overexposure may result in bronchitis or pneumonia with a bluish tint to the skin.; prolonged or repeated exposure can cause.; Reversible liver enzyme abnormalities.; Diarrhoea

Additional Information
RTECS: ZH4810000

12. ECOLOGICAL INFORMATION

12.1 Toxicity
Toxicity to fish LC50 - Oncorhynchus mykiss (rainbow trout) - 1,1 mg/l - 96,0 h
Toxicity to daphnia and other aquatic invertebrates EC50 - Daphnia magna (Water flea) - 0,098 mg/l - 48 h

12.2 Persistence and degradability
no data available

12.3 Bioaccumulative potential
no data available

12.4 Mobility in soil
no data available

12.5 Results of PBT and vPvB assessment
no data available

12.6 Other adverse effects
Very toxic to aquatic life.

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods
Product Offer surplus and non-recyclable solutions to a licensed disposal company. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Contaminated packaging Dispose of as unused product.

14. TRANSPORT INFORMATION

14.1 UN number
ADR/RID: 3077 IMDG: 3077 IATA: 3077

14.2 UN proper shipping name
ADR/RID: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (Zinc oxide)
IMDG: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (Zinc oxide)
IATA: Environmentally hazardous substance, solid, n.o.s. (Zinc oxide)

14.3 Transport hazard class(es)
ADR/RID: 9 IMDG: 9 IATA: 9
14.4 Packaging group
ADR/RID: III  IMDG: III  IATA: III

14.5 Environmental hazards
ADR/RID: yes  IMDG Marine pollutant: yes  IATA: yes

14.6 Special precautions for user

Further information
EHS-Mark required (ADR 2.2.9.1.10, IMDG code 2.10.3) for single packagings and combination packagings containing inner packagings with Dangerous Goods > 5L for liquids or > 5kg for solids.

15. REGULATORY INFORMATION
This safety datasheet complies with the requirements of Regulation (EC) No. 1907/2006.

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture
no data available

15.2 Chemical Safety Assessment
no data available

16. OTHER INFORMATION

Further information
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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.
SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers

Product name: Sodium hydroxymethanesulfinate hydrate

Product Number: 71530
Brand: Aldrich
REACH No.: A registration number is not available for this substance as the substance or its uses are exempted from registration, the annual tonnage does not require a registration or the registration is envisaged for a later registration deadline.
CAS-No.: 149-44-0

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses: Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet

Company: Sigma-Aldrich Chemie GmbH
Riedstrasse 2
D-89555 STEINHEIM

Telephone: +49 89-6513-1444
Fax: +49 7329-97-2319
E-mail address: eurtechserv@sial.com

1.4 Emergency telephone number

Emergency Phone #
0800 181 7059 (CHEMTREC Deutschland)
+49 (0)696 43508409 (CHEMTREC weltweit)

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

Classification according to Regulation (EC) No 1272/2008
Germ cell mutagenicity (Category 2), H341

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 Label elements

Labelling according Regulation (EC) No 1272/2008
Pictogram

Signal word: Warning
Hazard statement(s)
H341: Suspected of causing genetic defects.
Precautionary statement(s)
P280: Wear protective gloves/ protective clothing/ eye protection/ face protection.
2.3 Other hazards
This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

SECTION 3: Composition/information on ingredients

3.1 Substances

<table>
<thead>
<tr>
<th>Substance</th>
<th>Rongalit™</th>
<th>Sodium formaldehyde sulfoxylatehydrate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Formula</td>
<td>CH₃NaO₃S · xH₂O</td>
<td></td>
</tr>
<tr>
<td>Molecular weight</td>
<td>118.09 g/mol</td>
<td></td>
</tr>
<tr>
<td>CAS-No.</td>
<td>149-44-0</td>
<td></td>
</tr>
<tr>
<td>EC-No.</td>
<td>205-739-4</td>
<td></td>
</tr>
</tbody>
</table>

Hazardous ingredients according to Regulation (EC) No 1272/2008

<table>
<thead>
<tr>
<th>Component</th>
<th>Classification</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sodium hydroxymethanesulphinate hydrate</td>
<td>Muta. 2; H341</td>
<td>&lt;= 100 %</td>
</tr>
<tr>
<td>CAS-No.</td>
<td>149-44-0</td>
<td></td>
</tr>
<tr>
<td>EC-No.</td>
<td>205-739-4</td>
<td></td>
</tr>
</tbody>
</table>

For the full text of the H-Statements mentioned in this Section, see Section 16.

SECTION 4: First aid measures

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed

The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed

No data available

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
Dry powder

5.2 Special hazards arising from the substance or mixture

No data available
5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
No data available

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
Wear respiratory protection. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust. For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

6.3 Methods and materials for containment and cleaning up
Pick up and arrange disposal without creating dust. Sweep up and shovel. Do not flush with water. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid formation of dust and aerosols. Provide appropriate exhaust ventilation at places where dust is formed. For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Store in cool place. Keep container tightly closed in a dry and well-ventilated place. Never allow product to get in contact with water during storage. Do not store near acids.

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

SECTION 8: Exposure controls/personal protection

8.1 Control parameters
Components with workplace control parameters

8.2 Exposure controls
Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

   Eye/face protection
   Safety glasses with side-shields conforming to EN166 Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

   Skin protection
   Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.
   The selected protective gloves have to satisfy the specifications of EU Directive 89/686/EEC and the standard EN 374 derived from it.
   Full contact
   Material: Nitrile rubber
   Minimum layer thickness: 0,11 mm
   Break through time: 480 min
Material tested: Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0,11 mm
Break through time: 480 min

Material tested: Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)669 87300, e-mail sales@kcl.de,
test method: EN374

If used in solution, or mixed with other substances, and under conditions which differ from EN 374,
contact the supplier of the CE approved gloves. This recommendation is advisory only and must
be evaluated by an industrial hygienist and safety officer familiar with the specific situation of
anticipated use by our customers. It should not be construed as offering an approval for any
specific use scenario.

**Body Protection**
Impervious clothing. The type of protective equipment must be selected according to the
concentration and amount of the dangerous substance at the specific workplace.

**Respiratory protection**
Where risk assessment shows air-purifying respirators are appropriate use a full-face particle
respirator type N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineering
controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use
respirators and components tested and approved under appropriate government standards such
as NIOSH (US) or CEN (EU).

**Control of environmental exposure**
Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

---

**SECTION 9: Physical and chemical properties**

**9.1 Information on basic physical and chemical properties**

<table>
<thead>
<tr>
<th>a) Appearance</th>
<th>Form: powder</th>
</tr>
</thead>
<tbody>
<tr>
<td>b) Odour</td>
<td>sulphurous</td>
</tr>
<tr>
<td>c) Odour Threshold</td>
<td>No data available</td>
</tr>
<tr>
<td>d) pH</td>
<td>9,5 - 10,5</td>
</tr>
<tr>
<td>e) Melting point/freezing point</td>
<td>Melting point/range: 120 °C - dec.</td>
</tr>
<tr>
<td>f) Initial boiling point and boiling range</td>
<td>No data available</td>
</tr>
<tr>
<td>g) Flash point</td>
<td>&gt; 100 °C</td>
</tr>
<tr>
<td>h) Evaporation rate</td>
<td>No data available</td>
</tr>
<tr>
<td>i) Flammability (solid, gas)</td>
<td>No data available</td>
</tr>
<tr>
<td>j) Upper/lower flammability or explosive limits</td>
<td>No data available</td>
</tr>
<tr>
<td>k) Vapour pressure</td>
<td>No data available</td>
</tr>
<tr>
<td>l) Vapour density</td>
<td>No data available</td>
</tr>
<tr>
<td>m) Relative density</td>
<td>1,74 g/cm3 at ca.21 °C</td>
</tr>
<tr>
<td>n) Water solubility</td>
<td>1.000 g/l at 25 °C - OECD Test Guideline 105 - soluble</td>
</tr>
<tr>
<td>o) Partition coefficient: n-octanol/water</td>
<td>log Pow: &lt; 0,3 at 22 °C</td>
</tr>
<tr>
<td>p) Auto-ignition</td>
<td>No data available</td>
</tr>
</tbody>
</table>
9.2 Other safety information

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bulk density</td>
<td>850 - 900 kg/m³</td>
</tr>
</tbody>
</table>

SECTION 10: Stability and reactivity

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
No data available

10.5 Incompatible materials
Strong oxidizing agents, Acids

10.6 Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Carbon oxides, Sulphur oxides, Sodium oxides
Other decomposition products - No data available
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - female - >= 5.000 mg/kg
LD50 Dermal - Rat - male and female - >= 2.000 mg/kg
(OECD Test Guideline 402)

Skin corrosion/irritation
Skin - Rat
Result: No skin irritation - 24 h

Serious eye damage/eye irritation
Eyes - Rabbit
Result: No eye irritation - 24 h
(OECD Test Guideline 405)

Respiratory or skin sensitisation
Maximisation Test - Guinea pig
Result: Does not cause skin sensitisation.
(OECD Test Guideline 406)

Germ cell mutagenicity
In vitro tests showed mutagenic effects

Mouse
lymphocyte
Result: positive
Mutagenicity (micronucleus test)
Mouse - male and female
Result: positive

**Carcinogenicity**
IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

**Reproductive toxicity**
No data available
Suspected of damaging the unborn child. Suspected human reproductive toxicant

**Specific target organ toxicity - single exposure**
No data available

**Specific target organ toxicity - repeated exposure**
No data available

**Aspiration hazard**
No data available

**Additional Information**
Repeated dose toxicity
RTECS: PB0380000
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

### SECTION 12: Ecological information

#### 12.1 Toxicity

**Toxicity to fish**
LC50 - Leuciscus idus (Golden orfe) - > 10.000 mg/l - 96 h

**Toxicity to daphnia and other aquatic invertebrates**
Immobilization EC50 - Daphnia magna (Water flea) - > 100 mg/l - 48 h (OECD Test Guideline 202)

**Toxicity to algae**
Growth inhibition ErC50 - Desmodesmus subspicatus (green algae) - 370 mg/l - 72 h (OECD Test Guideline 201)

#### 12.2 Persistence and degradability

**Biodegradability**
aerobic - Exposure time 28 d
Result: 77 % - Readily biodegradable.
(OECD Test Guideline 301B)

**Biochemical Oxygen Demand (BOD)**
14 mg/g

**Chemical Oxygen Demand (COD)**
490 mg/g

#### 12.3 Bioaccumulative potential
No data available

#### 12.4 Mobility in soil
No data available

#### 12.5 Results of PBT and vPvB assessment
This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

#### 12.6 Other adverse effects
Additional ecological effects
No data available
SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product
Offer surplus and non-recyclable solutions to a licensed disposal company. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Contaminated packaging
Dispose of as unused product.

SECTION 14: Transport information

14.1 UN number
ADR/RID: -  
IMDG: -  
IATA: -  

14.2 UN proper shipping name
ADR/RID: Not dangerous goods  
IMDG: Not dangerous goods  
IATA: Not dangerous goods  

14.3 Transport hazard class(es)
ADR/RID: -  
IMDG: -  
IATA: -  

14.4 Packaging group
ADR/RID: -  
IMDG: -  
IATA: -  

14.5 Environmental hazards
ADR/RID: no  
IMDG Marine pollutant: no  
IATA: no  

14.6 Special precautions for user
No data available

SECTION 15: Regulatory information

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture
This safety datasheet complies with the requirements of Regulation (EC) No. 1907/2006.

15.2 Chemical safety assessment
For this product a chemical safety assessment was not carried out

SECTION 16: Other information

Full text of H-Statements referred to under sections 2 and 3.
EUH031 Contact with acids liberates toxic gas.
H341 Suspected of causing genetic defects.

Further information
Copyright 2016 Sigma-Aldrich Co. LLC. License granted to make unlimited paper copies for internal use only.
The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.
1. IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING

1.1 Product identifiers
   Product name : Sodium chloride solution
   Product Number : S6546
   Brand : Sigma-Aldrich

1.2 Relevant identified uses of the substance or mixture and uses advised against
   Identified uses : Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet
   Company : Sigma-Aldrich Chemie GmbH
   Riedstrasse 2
   D-89555 STEINHEIM
   Telephone : +49 89-6513-1444
   Fax : +49 7329-97-2319
   E-mail address : eurtechserv@sial.com

1.4 Emergency telephone number
   Emergency Phone # : 0800 181 7059 (CHEMTREC Deutschland)
   +49 (0)696 43508409 (CHEMTREC weltweit)

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture
   Not a hazardous substance or mixture according to Regulation (EC) No. 1272/2008.
   This substance is not classified as dangerous according to Directive 67/548/EEC.

2.2 Label elements
   The product does not need to be labelled in accordance with EC directives or respective national laws.

2.3 Other hazards - none

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.2 Mixtures
   Formula : ClNa
   Molecular Weight : 58.44 g/mol
   No components need to be disclosed according to the applicable regulations.

4. FIRST AID MEASURES

4.1 Description of first aid measures
   General advice
   Consult a physician. Show this safety data sheet to the doctor in attendance.

   If inhaled
   If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

   In case of skin contact
   Wash off with soap and plenty of water. Consult a physician.
In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

4.3 Indication of any immediate medical attention and special treatment needed
no data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media
Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
Hydrogen chloride gas, Sodium oxides

5.3 Advice for firefighters
Wear self contained breathing apparatus for fire fighting if necessary.

5.4 Further information
no data available

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures
Use personal protective equipment. Avoid breathing vapors, mist or gas. Ensure adequate ventilation.

6.2 Environmental precautions
Do not let product enter drains.

6.3 Methods and materials for containment and cleaning up
Soak up with inert absorbent material and dispose of as hazardous waste. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling
no data available

7.2 Conditions for safe storage, including any incompatibilities
Store in cool place. Keep container tightly closed in a dry and well-ventilated place.

7.3 Specific end uses
no data available

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters
Components with workplace control parameters

8.2 Exposure controls
Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.
Personal protective equipment

Eye/face protection
Safety glasses with side-shields conforming to EN166 Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove’s outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

The selected protective gloves have to satisfy the specifications of EU Directive 89/686/EEC and the standard EN 374 derived from it.

Body Protection
Impervious clothing. The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

| a)  | Appearance       | Form: clear, liquid                        |
| b)  | Odour            | no data available                          |
| c)  | Odour Threshold  | no data available                          |
| d)  | pH               | 6.0 - 8.0                                   |
| e)  | Melting point/freezing point | no data available                  |
| f)  | Initial boiling point and boiling range | no data available                      |
| g)  | Flash point      | no data available                          |
| h)  | Evaporation rate | no data available                          |
| i)  | Flammability (solid, gas) | no data available                           |
| j)  | Upper/lower flammability or explosive limits | no data available                          |
| k)  | Vapour pressure  | no data available                          |
| l)  | Vapour density   | no data available                          |
| m)  | Relative density | 1,190 g/cm³                                 |
| n)  | Water solubility | no data available                          |
| o)  | Partition coefficient: n-octanol/water   | no data available                          |
| p)  | Autoignition temperature              | no data available                          |
| q)  | Decomposition temperature              | no data available                          |
| r)  | Viscosity         | no data available                          |
s) Explosive properties  no data available
  t) Oxidizing properties  no data available

9.2 Other safety information
no data available

10. STABILITY AND REACTIVITY

10.1 Reactivity
no data available

10.2 Chemical stability
no data available

10.3 Possibility of hazardous reactions
no data available

10.4 Conditions to avoid
no data available

10.5 Incompatible materials
Strong oxidizing agents

10.6 Hazardous decomposition products
Other decomposition products - no data available

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

  Acute toxicity
  no data available

  Skin corrosion/irritation
  no data available

  Serious eye damage/eye irritation
  no data available

  Respiratory or skin sensitization
  no data available

  Germ cell mutagenicity
  no data available

  Carcinogenicity
  IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

  Reproductive toxicity
  no data available

  Specific target organ toxicity - single exposure
  no data available

  Specific target organ toxicity - repeated exposure
  no data available

  Aspiration hazard
  no data available

  Potential health effects

      Inhalation     May be harmful if inhaled. May cause respiratory tract irritation.
      Ingestion     May be harmful if swallowed.
      Skin          May be harmful if absorbed through skin. May cause skin irritation.
      Eyes          May cause eye irritation.
Signs and Symptoms of Exposure
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Additional Information
RTECS: Not available

12. ECOLOGICAL INFORMATION
12.1 Toxicity
no data available
12.2 Persistence and degradability
no data available
12.3 Bioaccumulative potential
no data available
12.4 Mobility in soil
no data available
12.5 Results of PBT and vPvB assessment
no data available
12.6 Other adverse effects
no data available

13. DISPOSAL CONSIDERATIONS
13.1 Waste treatment methods
Product
Offer surplus and non-recyclable solutions to a licensed disposal company.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION
14.1 UN number
ADR/RID: - IMDG: - IATA: -
14.2 UN proper shipping name
ADR/RID: Not dangerous goods IMDG: Not dangerous goods IATA: Not dangerous goods
14.3 Transport hazard class(es)
ADR/RID: - IMDG: - IATA: -
14.4 Packaging group
ADR/RID: - IMDG: - IATA: -
14.5 Environmental hazards
ADR/RID: no IMDG Marine pollutant: no IATA: no
14.6 Special precautions for user
no data available

15. REGULATORY INFORMATION
This safety datasheet complies with the requirements of Regulation (EC) No. 1907/2006.
15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture
no data available
15.2 Chemical Safety Assessment
no data available
16. OTHER INFORMATION

Further information
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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.
SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers

Product name : Sodium hydroxide

Product Number : S8045
Brand : Sigma-Aldrich
Index-No. : 011-002-00-6
REACH No. : 01-2119457892-27-XXXX
CAS-No. : 1310-73-2

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Chemie GmbH
Riedstrasse 2
D-89555 STEINHEIM

Telephone : +49 89-6513-1444
Fax : +49 7329-97-2319
E-mail address : eurtechserv@sial.com

1.4 Emergency telephone number

Emergency Phone # : 0800 181 7059 (CHEMTREC Deutschland)
+49 (0)696 43508409 (CHEMTREC weltweit)

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

Classification according to Regulation (EC) No 1272/2008
Corrosive to metals (Category 1), H290
Skin corrosion (Category 1A), H314

For the full text of the H-Statements mentioned in this Section, see Section 16.

Classification according to EU Directives 67/548/EEC or 1999/45/EC
C Corrosive R35

For the full text of the R-phrases mentioned in this Section, see Section 16.

2.2 Label elements

Labelling according Regulation (EC) No 1272/2008
Pictogram

Signal word : Danger
Hazard statement(s)
H290 May be corrosive to metals.
H314 Causes severe skin burns and eye damage.
Precautionary statement(s)
P280 Wear protective gloves/ protective clothing/ eye protection/ face
P303 + P361 + P353 IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.
P304 + P340 + P310 IF INHALED: Remove person to fresh air and keep comfortable for breathing. Immediately call a POISON CENTER or doctor/physician.
P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

Supplemental Hazard Statements none

2.3 Other hazards
This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

SECTION 3: Composition/information on ingredients

3.1 Substances

Synonyms: Caustic soda

Formula: NaOH
Molecular weight: 40.00 g/mol
CAS-No.: 1310-73-2
EC-No.: 215-185-5
Index-No.: 011-002-00-6
Registration number: 01-2119457892-27-XXXX

Hazardous ingredients according to Regulation (EC) No 1272/2008

<table>
<thead>
<tr>
<th>Component</th>
<th>Classification</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sodium hydroxide</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CAS-No.</td>
<td>1310-73-2</td>
<td></td>
</tr>
<tr>
<td>EC-No.</td>
<td>215-185-5</td>
<td></td>
</tr>
<tr>
<td>Index-No.</td>
<td>011-002-00-6</td>
<td></td>
</tr>
</tbody>
</table>
| Registration number | 01-2119457892-27-XXXX | <= 100 %

Hazardous ingredients according to Directive 1999/45/EC

<table>
<thead>
<tr>
<th>Component</th>
<th>Classification</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sodium hydroxide</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CAS-No.</td>
<td>1310-73-2</td>
<td></td>
</tr>
<tr>
<td>EC-No.</td>
<td>215-185-5</td>
<td></td>
</tr>
<tr>
<td>Index-No.</td>
<td>011-002-00-6</td>
<td></td>
</tr>
</tbody>
</table>
| Registration number | 01-2119457892-27-XXXX | <= 100 %

For the full text of the H-Statements and R-Phrases mentioned in this Section, see Section 16

SECTION 4: First aid measures

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Take off contaminated clothing and shoes immediately. Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.
If swallowed
Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

SECTION 5: Firefighting measures

5.1 Extinguishing media
Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
Sodium oxides

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
No data available

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
Wear respiratory protection. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust. For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up
Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling
Avoid formation of dust and aerosols. Provide appropriate exhaust ventilation at places where dust is formed. For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Store in cool place. Keep container tightly closed in a dry and well-ventilated place.

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated
SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Components with workplace control parameters

Derived No Effect Level (DNEL)

<table>
<thead>
<tr>
<th>Application Area</th>
<th>Exposure routes</th>
<th>Health effect</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Workers</td>
<td>Inhalation</td>
<td>Long-term local effects</td>
<td>1 mg/m³</td>
</tr>
<tr>
<td>Consumers</td>
<td>Inhalation</td>
<td>Long-term local effects</td>
<td>1 mg/m³</td>
</tr>
</tbody>
</table>

8.2 Exposure controls

Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove’s outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

The selected protective gloves have to satisfy the specifications of EU Directive 89/686/EEC and the standard EN 374 derived from it.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0,11 mm
Break through time: 480 min
Material tested: Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0,11 mm
Break through time: 480 min
Material tested: Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).
Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a) Appearance
   Form: pellets
   Colour: white

b) Odour
   Odourless

c) Odour Threshold
   No data available

d) pH
   14 at 50 g/l at 20 °C

e) Melting point/freezing point
   Melting point/range: 318 °C

f) Initial boiling point and boiling range
   1.390 °C

g) Flash point
   Not applicable

h) Evaporation rate
   No data available

i) Flammability (solid, gas)
   No data available

j) Upper/lower flammability or explosive limits
   No data available

k) Vapour pressure
   < 24,00 hPa at 20 °C
   4,00 hPa at 37 °C

l) Vapour density
   1,38 - (Air = 1.0)

m) Relative density
   2,1300 g/cm3

n) Water solubility
   ca.1.260 g/l at 20 °C

o) Partition coefficient: n-octanol/water
   No data available

p) Auto-ignition temperature
   No data available

q) Decomposition temperature
   No data available

r) Viscosity
   No data available

s) Explosive properties
   No data available

t) Oxidizing properties
   No data available

9.2 Other safety information

Bulk density
   ca.1.150 kg/m3

Relative vapour density
   1,38 - (Air = 1.0)

SECTION 10: Stability and reactivity

10.1 Reactivity
   No data available

10.2 Chemical stability
   Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
   No data available
10.4 Conditions to avoid
   No data available

10.5 Incompatible materials
   Strong oxidizing agents, Strong acids, Organic materials

10.6 Hazardous decomposition products
   Other decomposition products - No data available
   In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects
   Acute toxicity
   No data available

   Skin corrosion/irritation
   Skin - Rabbit
   Result: Causes severe burns. - 24 h

   Serious eye damage/eye irritation
   Eyes - Rabbit
   Result: Corrosive - 24 h

   Respiratory or skin sensitisation
   Will not occur

   Germ cell mutagenicity
   No data available

   Carcinogenicity
   IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

   Reproductive toxicity
   No data available

   Specific target organ toxicity - single exposure
   No data available

   Specific target organ toxicity - repeated exposure
   No data available

   Aspiration hazard
   No data available

   Additional Information
   RTECS: WB4900000
   Material is extremely destructive to tissue of the mucous membranes and upper respiratory tract, eyes, and skin.
   To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

SECTION 12: Ecological information

12.1 Toxicity
   Toxicity to fish
   LC50 - Gambusia affinis (Mosquito fish) - 125 mg/l - 96 h
   LC50 - Oncorhynchus mykiss (rainbow trout) - 45,4 mg/l - 96 h

   Toxicity to daphnia and other aquatic invertebrates
   Immobilization EC50 - Daphnia (water flea) - 40,38 mg/l - 48 h
12.2 **Persistence and degradability**
The methods for determining the biological degradability are not applicable to inorganic substances.

12.3 **Bioaccumulative potential**
No data available

12.4 **Mobility in soil**
No data available

12.5 **Results of PBT and vPvB assessment**
This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

12.6 **Other adverse effects**
Harmful to aquatic life.

**SECTION 13: Disposal considerations**

13.1 **Waste treatment methods**

**Product**
Offer surplus and non-recyclable solutions to a licensed disposal company. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

**Contaminated packaging**
Dispose of as unused product.

**SECTION 14: Transport information**

14.1 **UN number**

<table>
<thead>
<tr>
<th>ADR/RID:</th>
<th>IMDG:</th>
<th>IATA:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1823</td>
<td>1823</td>
<td>1823</td>
</tr>
</tbody>
</table>

14.2 **UN proper shipping name**

<table>
<thead>
<tr>
<th>ADR/RID:</th>
<th>IMDG:</th>
<th>IATA:</th>
</tr>
</thead>
<tbody>
<tr>
<td>SODIUM HYDROXIDE, SOLID</td>
<td>SODIUM HYDROXIDE, SOLID</td>
<td>Sodium hydroxide, solid</td>
</tr>
</tbody>
</table>

14.3 **Transport hazard class(es)**

<table>
<thead>
<tr>
<th>ADR/RID:</th>
<th>IMDG:</th>
<th>IATA:</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>8</td>
<td>8</td>
</tr>
</tbody>
</table>

14.4 **Packaging group**

<table>
<thead>
<tr>
<th>ADR/RID:</th>
<th>IMDG:</th>
<th>IATA:</th>
</tr>
</thead>
<tbody>
<tr>
<td>II</td>
<td>II</td>
<td>II</td>
</tr>
</tbody>
</table>

14.5 **Environmental hazards**

<table>
<thead>
<tr>
<th>ADR/RID:</th>
<th>IMDG Marine pollutant:</th>
<th>IATA:</th>
</tr>
</thead>
<tbody>
<tr>
<td>no</td>
<td>no</td>
<td>no</td>
</tr>
</tbody>
</table>

14.6 **Special precautions for user**
No data available

**SECTION 15: Regulatory information**

This safety datasheet complies with the requirements of Regulation (EC) No. 1907/2006.

15.1 **Safety, health and environmental regulations/legislation specific for the substance or mixture**

15.2 **Chemical Safety Assessment**
A Chemical Safety Assessment has been carried out for this substance.

**SECTION 16: Other information**

**Full text of H-Statements referred to under sections 2 and 3.**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>May be corrosive to metals.</td>
<td>Causes severe skin burns and eye damage.</td>
<td>Corrosive to metals</td>
</tr>
</tbody>
</table>
Skin Corr.  Skin corrosion

Full text of R-phrases referred to under sections 2 and 3
C  Corrosive
R35  Causes severe burns.

Further information
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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.
SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers
   Product name : Ammonium chloride
   Product Number : 254134
   Brand : Aldrich
   Index-No. : 017-014-00-8
   REACH No. : A registration number is not available for this substance as the substance or its uses are exempted from registration, the annual tonnage does not require a registration or the registration is envisaged for a later registration deadline.
   CAS-No. : 12125-02-9

1.2 Relevant identified uses of the substance or mixture and uses advised against
   Identified uses : Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet
   Company : Sigma-Aldrich Chemie GmbH
   Riedstrasse 2
   D-89555 STEINHEIM
   Telephone : +49 89-6513-1444
   Fax : +49 7329-97-2319
   E-mail address : eurtechserv@sidal.com

1.4 Emergency telephone number
   Emergency Phone #
   0800 181 7059 (CHEMTREC Deutschland)
   +49 (0)696 43508409 (CHEMTREC weltweit)

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture
   Classification according to Regulation (EC) No 1272/2008
   Acute toxicity, Oral (Category 4), H302
   Eye irritation (Category 2), H319
   For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 Label elements
   Pictogram
   Signal word : Warning
   Hazard statement(s)
   H302 : Harmful if swallowed.
   H319 : Causes serious eye irritation.
Precautionary statement(s)
P301 + P312 + P330 IF SWALLOWED: Call a POISON CENTER/doctor if you feel unwell.
Rinse mouth.
P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
Supplemental Hazard Statements none

2.3 Other hazards
This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

SECTION 3: Composition/information on ingredients

3.1 Substances
Synonyms : Salmiac
Formula : H₄CIN
Molecular weight : 53.49 g/mol
CAS-No. : 12125-02-9
EC-No. : 235-186-4
Index-No. : 017-014-00-8

Hazardous ingredients according to Regulation (EC) No 1272/2008

<table>
<thead>
<tr>
<th>Component</th>
<th>Classification</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ammonium chloride</td>
<td>Acute Tox. 4; Eye Irrit. 2;</td>
<td>&lt;= 100 %</td>
</tr>
<tr>
<td>CAS-No.</td>
<td>12125-02-9</td>
<td></td>
</tr>
<tr>
<td>EC-No.</td>
<td>235-186-4</td>
<td></td>
</tr>
<tr>
<td>Index-No.</td>
<td>017-014-00-8</td>
<td></td>
</tr>
</tbody>
</table>

For the full text of the H-Statements mentioned in this Section, see Section 16.

SECTION 4: First aid measures

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available
SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
No data available

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
No data available

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
Use personal protective equipment. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Avoid breathing dust.
For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up
Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid formation of dust and aerosols.
Provide appropriate exhaust ventilation at places where dust is formed.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Keep container tightly closed in a dry and well-ventilated place. Store in cool place.
Hygroscopic.

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

SECTION 8: Exposure controls/personal protection

8.1 Control parameters
Components with workplace control parameters

8.2 Exposure controls
Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection
Safety glasses with side-shields conforming to EN166 Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).
**Skin protection**
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove’s outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

The selected protective gloves have to satisfy the specifications of EU Directive 89/686/EEC and the standard EN 374 derived from it.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0,11 mm
Break through time: 480 min
Material tested: Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0,11 mm
Break through time: 480 min
Material tested: Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

**Body Protection**
Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

**Respiratory protection**
For nuisance exposures use type P95 (US) or type P1 (EU EN 143) particle respirator. For higher level protection use type OV/AG/P99 (US) or type ABEK-P2 (EU EN 143) respirator cartridges. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

**Control of environmental exposure**
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

---

**SECTION 9: Physical and chemical properties**

**9.1 Information on basic physical and chemical properties**

- **Appearance**  Form: powder
- **Odour**  No data available
- **Odour Threshold**  No data available
- **pH**  4.5 - 5.5 at 50,00000 g/l at 20,0 °C
- **Melting point/freezing point**  340,0 °C
- **Initial boiling point and boiling range**  No data available
- **Flash point**  Not applicable
- **Evaporation rate**  No data available
- **Flammability (solid, gas)**  No data available
- **Upper/lower flammability or**  No data available
explosive limits

k) Vapour pressure 1,3 hPa at 160,4 °C
l) Vapour density No data available
m) Relative density No data available
n) Water solubility soluble
o) Partition coefficient: n-octanol/water No data available
p) Auto-ignition temperature No data available
q) Decomposition temperature No data available
r) Viscosity No data available
s) Explosive properties No data available
t) Oxidizing properties No data available

9.2 Other safety information

Bulk density 500 kg/m3

SECTION 10: Stability and reactivity

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
Exposure to moisture may affect product quality.

10.5 Incompatible materials
Strong acids, Strong bases, Strong oxidizing agents

10.6 Hazardous decomposition products
Other decomposition products - No data available
Hazardous decomposition products formed under fire conditions. - Nitrogen oxides (NOx), Hydrogen chloride gas
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - 1.650 mg/kg

Skin corrosion/irritation
Skin - Rabbit
Result: No skin irritation

Serious eye damage/eye irritation
Eyes - Rabbit
Result: Eye irritation

Respiratory or skin sensitisation
Will not occur
**Germ cell mutagenicity**
No data available

**Carcinogenicity**
IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

**Reproductive toxicity**
No data available

**Specific target organ toxicity - single exposure**
No data available

**Specific target organ toxicity - repeated exposure**
No data available

**Aspiration hazard**
No data available

**Additional Information**
RTECS: BP4550000
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

---

**SECTION 12: Ecological information**

12.1 **Toxicity**
Toxicity to fish
LC50 - Oncorhynchus mykiss (rainbow trout) - 3,98 mg/l - 96 h
NOEC - Oncorhynchus mykiss (rainbow trout) - 57 mg/l - 96 h

Toxicity to daphnia and other aquatic invertebrates
LC50 - Daphnia magna (Water flea) - 161 mg/l - 48 h

Growth inhibition NOEC - Daphnia magna (Water flea) - 0,1 mg/l - 216 h

12.2 **Persistence and degradability**
No data available

12.3 **Bioaccumulative potential**
No data available

12.4 **Mobility in soil**
No data available

12.5 **Results of PBT and vPvB assessment**
This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

12.6 **Other adverse effects**
Toxic to aquatic life.
No data available

---

**SECTION 13: Disposal considerations**

13.1 **Waste treatment methods**

**Product**
Offer surplus and non-recyclable solutions to a licensed disposal company. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber. Waste material must be disposed of in accordance with the Directive on waste 2008/98/EC as well as other national and local regulations. Leave chemicals in original containers. No mixing with other waste. Handle uncleared containers like the product itself.
Contaminated packaging
Dispose of as unused product.

SECTION 14: Transport information

14.1 UN number
ADR/RID: -     IMDG: -     IATA: -

14.2 UN proper shipping name
ADR/RID: Not dangerous goods
IMDG: Not dangerous goods
IATA: Not dangerous goods

14.3 Transport hazard class(es)
ADR/RID: -     IMDG: -     IATA: -

14.4 Packaging group
ADR/RID: -     IMDG: -     IATA: -

14.5 Environmental hazards
ADR/RID: no     IMDG Marine pollutant: no     IATA: no

14.6 Special precautions for user
No data available

SECTION 15: Regulatory information

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture
This safety datasheet complies with the requirements of Regulation (EC) No. 1907/2006.

15.2 Chemical safety assessment
For this product a chemical safety assessment was not carried out

SECTION 16: Other information

Full text of H-Statements referred to under sections 2 and 3.
H302 Harmful if swallowed.
H319 Causes serious eye irritation.

Further information
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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.
SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 **Product identifiers**

   **Product name**: Copper(I) chloride

   **Product Number**: 256528
   **Brand**: Sigma-Aldrich
   **Index-No.**: 029-001-00-4
   **REACH No.**: A registration number is not available for this substance as the substance or its uses are exempted from registration, the annual tonnage does not require a registration or the registration is envisaged for a later registration deadline.
   **CAS-No.**: 7758-89-6

1.2 **Relevant identified uses of the substance or mixture and uses advised against**

   **Identified uses**: Laboratory chemicals, Manufacture of substances

1.3 **Details of the supplier of the safety data sheet**

   **Company**: Sigma-Aldrich Chemie GmbH
   **Riedstrasse 2**
   **D-89555 STEINHEIM**
   **Telephone**: +49 89-6513-1444
   **Fax**: +49 7329-97-2319
   **E-mail address**: eurtechserv@sigma.com

1.4 **Emergency telephone number**

   **Emergency Phone #**: 0800 181 7059 (CHEMTREC Deutschland)
   +49 (0)696 43508409 (CHEMTREC weltweit)

SECTION 2: Hazards identification

2.1 **Classification of the substance or mixture**

   **Classification according to Regulation (EC) No 1272/2008**
   - Acute toxicity, Oral (Category 4), H302
   - Skin irritation (Category 2), H315
   - Serious eye damage (Category 1), H318
   - Acute aquatic toxicity (Category 1), H400
   - Chronic aquatic toxicity (Category 1), H410

   For the full text of the H-Statements mentioned in this Section, see Section 16.

   **Classification according to EU Directives 67/548/EEC or 1999/45/EC**
   - **N**: Dangerous for the environment
     - R50/53
   - **Xi**: Irritant
     - R38, R41
   - **Xn**: Harmful
     - R22

   For the full text of the R-phrases mentioned in this Section, see Section 16.

2.2 **Label elements**

   **Labelling according Regulation (EC) No 1272/2008**
Signal word: Danger

Hazard statement(s):
- H302: Harmful if swallowed.
- H315: Causes skin irritation.
- H318: Causes serious eye damage.
- H410: Very toxic to aquatic life with long lasting effects.

Precautionary statement(s):
- P273: Avoid release to the environment.
- P280: Wear protective gloves/ eye protection/ face protection.
- P305 + P351 + P338: IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
- P501: Dispose of contents/ container to an approved waste disposal plant.

Supplemental Hazard Statements: none

2.3 Other hazards
This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

SECTION 3: Composition/information on ingredients

3.1 Substances
Synonyms: Cuprous chloride

Formula: CuCl
Molecular weight: 99.00 g/mol
CAS-No.: 7758-89-6
EC-No.: 231-842-9
Index-No.: 029-001-00-4

Hazardous ingredients according to Regulation (EC) No 1272/2008

<table>
<thead>
<tr>
<th>Component</th>
<th>Classification</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cuprous chloride</td>
<td>Acute Tox. 4; Skin Irrit. 2; Eye Dam. 1; Aquatic Acute 1; Aquatic Chronic 1; H302, H315, H318, H410</td>
<td>&lt;= 100 %</td>
</tr>
</tbody>
</table>

Hazardous ingredients according to Directive 1999/45/EC

<table>
<thead>
<tr>
<th>Component</th>
<th>Classification</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cuprous chloride</td>
<td>Xn, N, R22 - R50/53 - R38 - R41</td>
<td>&lt;= 100 %</td>
</tr>
</tbody>
</table>

For the full text of the H-Statements and R-Phrases mentioned in this Section, see Section 16

SECTION 4: First aid measures

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.
In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
Hydrogen chloride gas, Copper oxides

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
No data available

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
Use personal protective equipment. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust. For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up
Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid formation of dust and aerosols. Provide appropriate exhaust ventilation at places where dust is formed. For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Store in cool place. Keep container tightly closed in a dry and well-ventilated place.

Air, light, and moisture sensitive.
Storage class (TRGS 510): Non Combustible Solids

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated
SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Components with workplace control parameters

8.2 Exposure controls

Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove’s outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

The selected protective gloves have to satisfy the specifications of EU Directive 89/686/EEC and the standard EN 374 derived from it.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0,11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0,11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374

If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Complete suit protecting against chemicals. The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.
SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a) Appearance
   Form: granules
   Colour: beige

b) Odour
   No data available

c) Odour Threshold
   No data available

d) pH
   5 at 50 g/l at 20 °C

e) Melting point/freezing point
   Melting point/range: 430 °C - lit.

f) Initial boiling point and boiling range
   1,490 °C - lit.

g) Flash point
   Not applicable

h) Evaporation rate
   No data available

i) Flammability (solid, gas)
   No data available

j) Upper/lower flammability or explosive limits
   No data available

k) Vapour pressure
   1,7 hPa at 546 °C

l) Vapour density
   No data available

m) Relative density
   4,140 g/cm3

n) Water solubility
   0,047 g/l at 20 °C - slightly soluble

o) Partition coefficient: n-octanol/water
   No data available

p) Auto-ignition temperature
   No data available

q) Decomposition temperature
   No data available

r) Viscosity
   No data available

s) Explosive properties
   No data available

t) Oxidizing properties
   No data available

9.2 Other safety information

Bulk density
   1,7 g/l at 20 °C

SECTION 10: Stability and reactivity

10.1 Reactivity
   No data available

10.2 Chemical stability
   Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
   No data available

10.4 Conditions to avoid
   Air. Avoid moisture. Light.

10.5 Incompatible materials
   Oxidizing agents, Alkali metals
10.6 **Hazardous decomposition products**
Other decomposition products - No data available
In the event of fire: see section 5

**SECTION 11: Toxicological information**

11.1 **Information on toxicological effects**

**Acute toxicity**
LD50 Oral - Rat - 336 mg/kg
LC50 Inhalation - Mouse - 1.008 mg/m3

**Skin corrosion/irritation**
Skin - Rabbit
Result: Irritating to skin.

**Serious eye damage/eye irritation**
Eyes - Rabbit
Result: Risk of serious damage to eyes.

**Respiratory or skin sensitisation**
Maximisation Test (GPMT) - Guinea pig
Does not cause skin sensitisation.
(OECD Test Guideline 406)

**Germ cell mutagenicity**
Rat
Ascites tumor
Cytogenetic analysis

**Carcinogenicity**
IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

**Reproductive toxicity**
No data available

**Specific target organ toxicity - single exposure**
No data available

**Specific target organ toxicity - repeated exposure**
No data available

**Aspiration hazard**
No data available

**Additional Information**
RTECS: GL6990000

Symptoms of systemic copper poisoning may include: capillary damage, headache, cold sweat, weak pulse, and kidney and liver damage, central nervous system excitement followed by depression, jaundice, convulsions, paralysis, and coma. Death may occur from shock or renal failure. Chronic copper poisoning is typified by hepatic cirrhosis, brain damage and demyelination, kidney defects, and copper deposition in the cornea as exemplified by humans with Wilson's disease. It has also been reported that copper poisoning has lead to hemolytic anemia and accelerates arteriosclerosis.

**SECTION 12: Ecological information**

12.1 **Toxicity**
Toxicity to fish
LC50 - Oncorhynchus mykiss (rainbow trout) - 0,05 - 0,36 mg/l - 96,0 h

12.2 **Persistence and degradability**
No data available
12.3 **Bioaccumulative potential**  
No data available

12.4 **Mobility in soil**  
No data available

12.5 **Results of PBT and vPvB assessment**  
This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

12.6 **Other adverse effects**  
Very toxic to aquatic life with long lasting effects.

**SECTION 13: Disposal considerations**

13.1 **Waste treatment methods**

**Product**  
Offer surplus and non-recyclable solutions to a licensed disposal company. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

**Contaminated packaging**  
Dispose of as unused product.

**SECTION 14: Transport information**

14.1 **UN number**  
ADR/RID: 2802  
IMDG: 2802  
IATA: 2802

14.2 **UN proper shipping name**  
ADR/RID: COPPER CHLORIDE  
IMDG: COPPER CHLORIDE  
IATA: Copper chloride

14.3 **Transport hazard class(es)**  
ADR/RID: 8  
IMDG: 8  
IATA: 8

14.4 **Packaging group**  
ADR/RID: III  
IMDG: III  
IATA: III

14.5 **Environmental hazards**  
ADR/RID: yes  
IMDG Marine pollutant: yes  
IATA: no

14.6 **Special precautions for user**  
No data available

**SECTION 15: Regulatory information**

This safety datasheet complies with the requirements of Regulation (EC) No. 1907/2006.

15.1 **Safety, health and environmental regulations/legislation specific for the substance or mixture**  
No data available

15.2 **Chemical Safety Assessment**  
For this product a chemical safety assessment was not carried out

**SECTION 16: Other information**

**Full text of H-Statements referred to under sections 2 and 3.**

Acute Tox.  
Acute toxicity

Aquatic Acute  
Acute aquatic toxicity

Aquatic Chronic  
Chronic aquatic toxicity

Eye Dam.  
Serious eye damage
Full text of R-phrases referred to under sections 2 and 3

N       Dangerous for the environment
Xn      Harmful
R22     Harmful if swallowed.
R38     Irritating to skin.
R41     Risk of serious damage to eyes.
R50/53  Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

Further information
Copyright 2014 Sigma-Aldrich Co. LLC. License granted to make unlimited paper copies for internal use only.
The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.
1. IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING

1.1 Product identifiers

Product name: 3,4-Dichloro-1-butene

Product Number: 159301
Brand: Aldrich
CAS-No.: 760-23-6

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses: Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet

Company: Sigma-Aldrich Chemie GmbH
Riedstrasse 2
D-89555 STEINHEIM

Telephone: +49 89-6513-1444
Fax: +49 7329-97-2319
E-mail address: eurtechserv@sial.com

1.4 Emergency telephone number

Emergency Phone #: 0800 181 7059 (CHEMTREC Deutschland)
+49 (0)696 43508409 (CHEMTREC weltweit)

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

Classification according to Regulation (EC) No 1272/2008 [EU-GHS/CLP]
Flammable liquids (Category 3)
Acute toxicity, Oral (Category 4)
Acute toxicity, Inhalation (Category 4)
Skin corrosion (Category 1B)

Classification according to EU Directives 67/548/EEC or 1999/45/EC
Flammable. Harmful by inhalation and if swallowed. Causes burns.

2.2 Label elements

Labelling according Regulation (EC) No 1272/2008 [CLP]

Pictogram

Signal word: Danger

Hazard statement(s)
H226 Flammable liquid and vapour.
H302 Harmful if swallowed.
H314 Causes severe skin burns and eye damage.
H332 Harmful if inhaled.

Precautionary statement(s)
P280 Wear protective gloves/ protective clothing/ eye protection/ face protection.
P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove

**R-phrase(s)**
- R10 Flammable.
- R20/22 Harmful by inhalation and if swallowed.
- R34 Causes burns.

**S-phrase(s)**
- S16 Keep away from sources of ignition - No smoking.
- S26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
- S36/37/39 Wear suitable protective clothing, gloves and eye/face protection.
- S45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

### 2.3 Other hazards
Lachrymator.

### 3. COMPOSITION/INFORMATION ON INGREDIENTS

#### 3.1 Substances

<table>
<thead>
<tr>
<th>Component</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>3,4-Dichloro-1-butene</td>
<td></td>
</tr>
<tr>
<td>CAS-No.</td>
<td>760-23-6</td>
</tr>
<tr>
<td>EC-No.</td>
<td>212-079-0</td>
</tr>
</tbody>
</table>

#### 4. FIRST AID MEASURES

#### 4.1 Description of first aid measures

**General advice**
Consult a physician. Show this safety data sheet to the doctor in attendance.

**If inhaled**
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

**In case of skin contact**
Take off contaminated clothing and shoes immediately. Wash off with soap and plenty of water. Consult a physician.

**In case of eye contact**
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

**If swallowed**
Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

#### 4.2 Most important symptoms and effects, both acute and delayed
Material is extremely destructive to tissue of the mucous membranes and upper respiratory tract, eyes, and skin., spasm, inflammation and edema of the larynx, spasm, inflammation and edema of the bronchi, pneumonitis, pulmonary edema, burning sensation, Cough, wheezing, laryngitis, Shortness of breath, Headache, Nausea

#### 4.3 Indication of any immediate medical attention and special treatment needed
no data available
5. **FIREFIGHTING MEASURES**

5.1 **Extinguishing media**

**Suitable extinguishing media**
For small (incipient) fires, use media such as "alcohol" foam, dry chemical, or carbon dioxide. For large fires, apply water from as far as possible. Use very large quantities (flooding) of water applied as a mist or spray; solid streams of water may be ineffective. Cool all affected containers with flooding quantities of water.

5.2 **Special hazards arising from the substance or mixture**
Carbon oxides, Hydrogen chloride gas

5.3 **Advice for firefighters**
Wear self contained breathing apparatus for fire fighting if necessary.

5.4 **Further information**
Use water spray to cool unopened containers.

6. **ACCIDENTAL RELEASE MEASURES**

6.1 **Personal precautions, protective equipment and emergency procedures**
Use personal protective equipment. Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapours accumulating to form explosive concentrations. Vapours can accumulate in low areas.

6.2 **Environmental precautions**
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 **Methods and materials for containment and cleaning up**
Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations (see section 13).

6.4 **Reference to other sections**
For disposal see section 13.

7. **HANDLING AND STORAGE**

7.1 **Precautions for safe handling**
Avoid contact with skin and eyes. Avoid inhalation of vapour or mist. Keep away from sources of ignition - No smoking. Take measures to prevent the build up of electrostatic charge.

7.2 **Conditions for safe storage, including any incompatibilities**
Store in cool place. Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.

Recommended storage temperature: 2 - 8 °C

7.3 **Specific end use(s)**
no data available

8. **EXPOSURE CONTROLS/PERSONAL PROTECTION**

8.1 **Control parameters**
Components with workplace control parameters

8.2 **Exposure controls**

**Appropriate engineering controls**
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.
Personal protective equipment

**Eye/face protection**
Tightly fitting safety goggles. Faceshield (8-inch minimum). Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

**Skin protection**
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

The selected protective gloves have to satisfy the specifications of EU Directive 89/686/EEC and the standard EN 374 derived from it.

**Body Protection**
Complete suit protecting against chemicals, Flame retardant antistatic protective clothing. The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

**Respiratory protection**
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

| a) Appearance            | Form: liquid
 | Colour: light yellow    |
| b) Odour                 | no data available |
| c) Odour Threshold       | no data available |
| d) pH                    | no data available |
| e) Melting point/freezing point | Melting point/range: -61 °C - lit. |
| f) Initial boiling point and boiling range | 123 °C - lit. |
| g) Flash point           | 28 °C - closed cup |
| h) Evaporation rate      | no data available |
| i) Flammability (solid, gas) | no data available |
| j) Upper/lower flammability or explosive limits | no data available |
| k) Vapour pressure       | 23 hPa at 25 °C |
| l) Vapour density        | 4.31 - (Air = 1.0) |
| m) Relative density      | 1.15 g/cm3 at 25 °C |
| n) Water solubility      | no data available |
| o) Partition coefficient: n-octanol/water | no data available |
| p) Auto-ignition temperature | no data available |
| q) Decomposition temperature | no data available |
9.2 Other safety information
no data available

10. STABILITY AND REACTIVITY

10.1 Reactivity
no data available

10.2 Chemical stability
no data available

10.3 Possibility of hazardous reactions
no data available

10.4 Conditions to avoid
Heat, flames and sparks.

10.5 Incompatible materials
Strong oxidizing agents, Strong oxidizing agents, Strong bases

10.6 Hazardous decomposition products
Other decomposition products - no data available

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - mouse - 724 mg/kg

LC50 Inhalation - rat - 4 h - 2100 ppm

Skin corrosion/irritation
no data available

Serious eye damage/eye irritation
no data available

Respiratory or skin sensitization
no data available

Germ cell mutagenicity
no data available

Carcinogenicity
IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

Reproductive toxicity
no data available

Specific target organ toxicity - single exposure
no data available

Specific target organ toxicity - repeated exposure
no data available

Aspiration hazard
no data available
Potential health effects

**Inhalation**
Harmful if inhaled. Material is extremely destructive to the tissue of the mucous membranes and upper respiratory tract.

**Ingestion**
Harmful if swallowed. Causes burns.

**Skin**
May be harmful if absorbed through skin. Causes skin burns.

**Eyes**
Causes eye burns.

**Signs and Symptoms of Exposure**
Material is extremely destructive to tissue of the mucous membranes and upper respiratory tract, eyes, and skin., spasm, inflammation and edema of the larynx, spasm, inflammation and edema of the bronchi, pneumonia, pulmonary edema, burning sensation, Cough, wheezing, laryngitis, Shortness of breath, Headache, Nausea

**Additional Information**
RTECS: EM4740000

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12. **ECOLOGICAL INFORMATION**

12.1 **Toxicity**
Toxicity to fish
LC50 - Pimephales promelas (fathead minnow) - 7,17 mg/l - 96 h

12.2 **Persistence and degradability**
no data available

12.3 **Bioaccumulative potential**
no data available

12.4 **Mobility in soil**
no data available

12.5 **Results of PBT and vPvB assessment**
no data available

12.6 **Other adverse effects**
Toxic to aquatic life.
no data available

---

13. **DISPOSAL CONSIDERATIONS**

13.1 **Waste treatment methods**

**Product**
Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material.

**Contaminated packaging**
Dispose of as unused product.

---

14. **TRANSPORT INFORMATION**

14.1 **UN number**
ADR/RID: 2920  
IMDG: 2920  
IATA: 2920

14.2 **UN proper shipping name**
ADR/RID: CORROSIVE LIQUID, FLAMMABLE, N.O.S. (3,4-Dichloro-1-butene)
IMDG: CORROSIVE LIQUID, FLAMMABLE, N.O.S. (3,4-Dichloro-1-butene)
IATA: Corrosive liquid, flammable, n.o.s. (3,4-Dichloro-1-butene)

14.3 **Transport hazard class(es)**
ADR/RID: 8 (3)  
IMDG: 8 (3)  
IATA: 8 (3)

14.4 **Packaging group**
ADR/RID: II  
IMDG: II  
IATA: II

14.5 **Environmental hazards**
ADR/RID: no  
IMDG Marine Pollutant: no  
IATA: no
14.6 Special precautions for user
no data available

15. REGULATORY INFORMATION
This safety datasheet complies with the requirements of Regulation (EC) No. 1907/2006.

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture
no data available

15.2 Chemical Safety Assessment
no data available

16. OTHER INFORMATION
Further information
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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.
SAFETY DATA SHEET
DOW CHEMICAL COMPANY LIMITED
Safety Data Sheet according to Reg. (EU) No 2015/830

Product name: Propionic Acid

DOW CHEMICAL COMPANY LIMITED encourages and expects you to read and understand the entire (M)SDS, as there is important information throughout the document. We expect you to follow the precautions identified in this document unless your use conditions would necessitate other appropriate methods or actions.

SECTION 1: IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING

1.1 Product identifier
Product name: Propionic Acid

Chemical name of the substance: propionic acid
CASRN: 79-09-4
EC-No.: 201-176-3
REACH Registration Number: 01-2119486971-24-0001

1.2 Relevant identified uses of the substance or mixture and uses advised against

1.3 Details of the supplier of the safety data sheet
COMPANY IDENTIFICATION
DOW CHEMICAL COMPANY LIMITED
DIAMOND HOUSE, LOTUS PARK,
KINGSBURY CRESCENT,
STAINES
England
TW18 3AG
UNITED KINGDOM

Customer Information Number: +44 (0) 203 139 4000
SDSQuestion@dow.com

1.4 EMERGENCY TELEPHONE NUMBER
24-Hour Emergency Contact: 0031 115 694 982
Local Emergency Contact: 00 31 115 69 4982

SECTION 2: HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture
Classification according to Regulation (EC) No 1272/2008:
Flammable liquids - Category 3 - H226
Skin corrosion - Category 1B - H314
Serious eye damage - Category 1 - H318
Specific target organ toxicity - single exposure - Category 3 - H335
For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 Label elements

Labelling according to Regulation (EC) No 1272/2008:

Hazard pictograms

Signal word: DANGER

Hazard statements
H226 Flammable liquid and vapour.
H314 Causes severe skin burns and eye damage.
H335 May cause respiratory irritation.

Precautionary statements
P210 Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
P280 Wear protective gloves/ protective clothing/ eye protection/ face protection.
P303 + P361 IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.
P304 + P340 IF INHALED: Remove person to fresh air and keep comfortable for breathing.
P310 Immediately call a POISON CENTER/doctor.
P305 + P351 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a POISON CENTER/doctor.
P310 CENTER/doctor.
P370 + P378 In case of fire: Use dry sand, dry chemical or alcohol-resistant foam to extinguish.

2.3 Other hazards
No data available

SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

This product is a substance.
SECTION 4: FIRST AID MEASURES

4.1 Description of first aid measures

General advice: First Aid responders should pay attention to self-protection and use the recommended protective clothing (chemical resistant gloves, splash protection). If potential for exposure exists refer to Section 8 for specific personal protective equipment.

Inhalation: Move person to fresh air. If person is not breathing, call an emergency responder or ambulance, then give artificial respiration; if by mouth to mouth use rescuer protection (pocket mask etc). Call a poison control center or doctor for treatment advice.

Skin contact: Take off contaminated clothing. Rinse skin immediately with plenty of water for 15-20 minutes. Call a poison control center or doctor for treatment advice. Suitable emergency safety shower facility should be immediately available.

Eye contact: Wash immediately and continuously with flowing water for at least 30 minutes. Remove contact lenses after the first 5 minutes and continue washing. Obtain prompt medical consultation, preferably from an ophthalmologist. Suitable emergency eye wash facility should be immediately available.

Ingestion: Call a poison control center or doctor immediately for treatment advice. Have person sip a glass of water if able to swallow. Do not induce vomiting unless told to do so by the poison control center or doctor. Never give anything by mouth to an unconscious person.

4.2 Most important symptoms and effects, both acute and delayed: Aside from the information found under Description of first aid measures (above) and Indication of immediate medical attention and special treatment needed (below), any additional important symptoms and effects are described in Section 11: Toxicology Information.

4.3 Indication of any immediate medical attention and special treatment needed

Notes to physician: Chemical eye burns may require extended irrigation. Obtain prompt consultation, preferably from an ophthalmologist. If burn is present, treat as any thermal burn, after decontamination. Due to irritant properties, swallowing may result in burns/ulceration of mouth, stomach and lower gastrointestinal tract with subsequent stricture. Aspiration of vomitus may cause lung injury. Suggest endotracheal/esophageal control if lavage is done. Probable mucosal damage may contraindicate the use of gastric lavage. No specific antidote. Treatment of exposure should be directed at the control of symptoms and the clinical condition of the patient. Have the Safety Data
Sheet, and if available, the product container or label with you when calling a poison control center or doctor, or going for treatment.

SECTION 5: FIREFIGHTING MEASURES

5.1 Extinguishing media
Suitable extinguishing media: Water fog or fine spray. Dry chemical fire extinguishers. Carbon dioxide fire extinguishers. Foam. Alcohol resistant foams (ATC type) are preferred. General purpose synthetic foams (including AFFF) or protein foams may function, but will be less effective.

Unsuitable extinguishing media: No data available

5.2 Special hazards arising from the substance or mixture
Hazardous combustion products: During a fire, smoke may contain the original material in addition to combustion products of varying composition which may be toxic and/or irritating. Combustion products may include and are not limited to: Carbon monoxide. Carbon dioxide.

Unusual Fire and Explosion Hazards: Violent steam generation or eruption may occur upon application of direct water stream to hot liquids. Vapors are heavier than air and may travel a long distance and accumulate in low lying areas. Ignition and/or flash back may occur.

5.3 Advice for firefighters
Fire Fighting Procedures: Keep people away. Isolate fire and deny unnecessary entry. Stay upwind. Keep out of low areas where gases (fumes) can accumulate. Use water spray to cool fire exposed containers and fire affected zone until fire is out and danger of reignition has passed. Burning liquids may be extinguished by dilution with water. Do not use direct water stream. May spread fire. Eliminate ignition sources. Burning liquids may be moved by flushing with water to protect personnel and minimize property damage.

Special protective equipment for firefighters: Wear positive-pressure self-contained breathing apparatus (SCBA) and protective fire fighting clothing (includes fire fighting helmet, coat, trousers, boots, and gloves). Avoid contact with this material during fire fighting operations. If contact is likely, change to full chemical resistant fire fighting clothing with self-contained breathing apparatus. If this is not available, wear full chemical resistant clothing with self-contained breathing apparatus and fight fire from a remote location. For protective equipment in post-fire or non-fire clean-up situations, refer to the relevant sections.

SECTION 6: ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures: Evacuate area. Refer to section 7, Handling, for additional precautionary measures. Only trained and properly protected personnel must be involved in clean-up operations. Keep personnel out of low areas. Keep upwind of spill. Ventilate area of leak or spill. No smoking in area. Eliminate all sources of ignition in vicinity of spill or released vapor to avoid fire or explosion. Vapor explosion hazard. Keep out of sewers. Use appropriate safety equipment. For additional information, refer to Section 8, Exposure Controls and Personal Protection.

6.2 Environmental precautions: Prevent from entering into soil, ditches, sewers, waterways and/or groundwater. See Section 12, Ecological Information.
6.3 **Methods and materials for containment and cleaning up**: Contain spilled material if possible. Small spills: Attempt to neutralize by adding materials such as Gastrointestinal irritation. Large spills: Pump with explosion-proof equipment. If available, use foam to smother or suppress. Collect in suitable and properly labeled containers. See Section 13, Disposal Considerations, for additional information.

6.4 **Reference to other sections**: References to other sections, if applicable, have been provided in the previous sub-sections.

### SECTION 7: HANDLING AND STORAGE

7.1 **Precautions for safe handling**: Keep away from heat, sparks and flame. Do not get in eyes, on skin, on clothing. Do not swallow. Avoid breathing vapor. Wash thoroughly after handling. Keep container closed. Use with adequate ventilation. No smoking, open flames or sources of ignition in handling and storage area. Vapors are heavier than air and may travel a long distance and accumulate in low lying areas. Ignition and/or flash back may occur. Electrically ground and bond all equipment. Use of non-sparking or explosion-proof equipment may be necessary, depending upon the type of operation. Containers, even those that have been emptied, can contain vapors. Do not cut, drill, grind, weld, or perform similar operations on or near empty containers. See Section 8, EXPOSURE CONTROLS AND PERSONAL PROTECTION.

7.2 **Conditions for safe storage, including any incompatibilities**: Minimize sources of ignition, such as static build-up, heat, spark or flame. Store in tightly closed, properly vented containers.

7.3 **Specific end use(s)**: See the technical data sheet on this product for further information.

### SECTION 8: EXPOSURE CONTROLS/PERSOAL PROTECTION

8.1 **Control parameters**

Exposure limits are listed below, if they exist.

<table>
<thead>
<tr>
<th>Component</th>
<th>Regulation</th>
<th>Type of listing</th>
<th>Value/Notation</th>
</tr>
</thead>
<tbody>
<tr>
<td>propionic acid</td>
<td>ACGIH</td>
<td>TWA</td>
<td>10 ppm</td>
</tr>
<tr>
<td></td>
<td>Dow IHG</td>
<td>TWA</td>
<td>10 ppm</td>
</tr>
<tr>
<td></td>
<td>Dow IHG</td>
<td>STEL</td>
<td>15 ppm</td>
</tr>
<tr>
<td>2000/39/EC</td>
<td>TWA</td>
<td>31 mg/m³</td>
<td>10 ppm</td>
</tr>
<tr>
<td>2000/39/EC</td>
<td>STEL</td>
<td>62 mg/m³</td>
<td>20 ppm</td>
</tr>
<tr>
<td>GB EH40</td>
<td>TWA</td>
<td>31 mg/m³</td>
<td>10 ppm</td>
</tr>
<tr>
<td>GB EH40</td>
<td>STEL</td>
<td>46 mg/m³</td>
<td>15 ppm</td>
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**Derived No Effect Level**

**Workers**

<table>
<thead>
<tr>
<th>Acute - systemic effects</th>
<th>Acute – local effects</th>
<th>Long-term – systemic effects</th>
<th>Long-term – local effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dermal</td>
<td>Inhalation</td>
<td>Dermal</td>
<td>Inhalation</td>
</tr>
<tr>
<td>n.a.</td>
<td>n.a.</td>
<td>62 mg/m³</td>
<td>20.9 mg/kg bw/day</td>
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<tr>
<td></td>
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<td>73 mg/m³</td>
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</tbody>
</table>

**Consumers**

<table>
<thead>
<tr>
<th>Acute - systemic effects</th>
<th>Acute – local effects</th>
<th>Long-term – systemic effects</th>
<th>Long-term – local effects</th>
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</table>
Predicted No Effect Concentration

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<tr>
<th>Compartment</th>
<th>PNEC</th>
<th>Remarks</th>
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<tr>
<td>Fresh water</td>
<td>0.5 mg/l</td>
<td></td>
</tr>
<tr>
<td>Marine water</td>
<td>0.05 mg/l</td>
<td></td>
</tr>
<tr>
<td>Intermittent releases</td>
<td>5 mg/l</td>
<td></td>
</tr>
<tr>
<td>STP</td>
<td>5 mg/l</td>
<td></td>
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<tr>
<td>Fresh water sediment</td>
<td>1.86 mg/kg d.w.</td>
<td></td>
</tr>
<tr>
<td>Marine sediment</td>
<td>0.186 mg/kg d.w.</td>
<td></td>
</tr>
<tr>
<td>Soil</td>
<td>0.1258 mg/kg d.w.</td>
<td></td>
</tr>
</tbody>
</table>

8.2 Exposure controls
Engineering controls: Use local exhaust ventilation, or other engineering controls to maintain airborne levels below exposure limit requirements or guidelines. If there are no applicable exposure limit requirements or guidelines, general ventilation should be sufficient for most operations. Local exhaust ventilation may be necessary for some operations.

Individual protection measures

Eye/face protection: Use chemical goggles. Chemical goggles should be consistent with EN 166 or equivalent. If exposure causes eye discomfort, use a full-face respirator.

Skin protection

Hand protection: Use chemical resistant gloves classified under Standard EN374: Protective gloves against chemicals and micro-organisms. Examples of preferred glove barrier materials include: Chlorinated polyethylene. Neoprene. Polyethylene. Ethyl vinyl alcohol laminate ("EVAL"). Polyvinyl chloride ("PVC" or "vinyl"). Viton. Examples of acceptable glove barrier materials include: Butyl rubber. Natural rubber ("latex"). Nitrile/butadiene rubber ("nitrile" or "NBR"). Polyvinyl alcohol ("PVA"). When prolonged or frequently repeated contact may occur, a glove with a protection class of 5 or higher (breakthrough time greater than 240 minutes according to EN 374) is recommended. When only brief contact is expected, a glove with a protection class of 3 or higher (breakthrough time greater than 60 minutes according to EN 374) is recommended. NOTICE: The selection of a specific glove for a particular application and duration of use in a workplace should also take into account all relevant workplace factors such as, but not limited to: Other chemicals which may be handled, physical requirements (cut/puncture protection, dexterity, thermal protection), potential body reactions to glove materials, as well as the instructions/specifications provided by the glove supplier.

Other protection: Use protective clothing chemically resistant to this material. Selection of specific items such as face shield, boots, apron, or full body suit will depend on the task.

Respiratory protection: Respiratory protection should be worn when there is a potential to exceed the exposure limit requirements or guidelines. If there are no applicable exposure limit requirements or guidelines, wear respiratory protection when adverse effects, such as respiratory irritation or discomfort have been experienced, or where indicated by your risk assessment process. For most conditions no respiratory protection should be needed; however, if discomfort is experienced, use an approved air-purifying respirator. Use the following CE approved air-purifying respirator: Organic vapor cartridge, type A (boiling point >65 °C)
### Environmental exposure controls
See SECTION 7: Handling and storage and SECTION 13: Disposal considerations for measures to prevent excessive environmental exposure during use and waste disposal.

### SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

#### 9.1 Information on basic physical and chemical properties

**Appearance**

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical state</td>
<td>Liquid</td>
</tr>
<tr>
<td>Color</td>
<td>Colorless</td>
</tr>
<tr>
<td>Odor</td>
<td>pungent</td>
</tr>
<tr>
<td>Odor Threshold</td>
<td>No test data available</td>
</tr>
<tr>
<td>pH</td>
<td>2.5 Literature</td>
</tr>
<tr>
<td>Melting point/range</td>
<td>Not applicable to liquids</td>
</tr>
<tr>
<td>Freezing point</td>
<td>&lt; -20 °C Literature</td>
</tr>
<tr>
<td>Boiling point (760 mmHg)</td>
<td>104.9 °C at 760 mmHg Literature at 1.013 hPa</td>
</tr>
<tr>
<td>Flash point</td>
<td>closed cup 50.5 °C Pensky-Martens Closed Cup ASTM D 93</td>
</tr>
</tbody>
</table>

**Evaporation Rate (Butyl Acetate = 1)**

- 0.24 Estimated.

**Flammability (solid, gas)**

- Not Applicable

**Lower explosion limit**

- 2.9 % vol Literature

**Upper explosion limit**

- 12.1 % vol Literature

**Vapor Pressure**

- 0.399 kPa at 23 °C Literature

**Relative Vapor Density (air = 1)**

- 2.6 Literature (relative to air at 25°C)

**Relative Density (water = 1)**

- 0.9950 at 20 °C / 20 °C Literature

**Water solubility**

- 100 % Literature

**Partition coefficient: n-octanol/water**

- Log Pow: 0.33 Measured

**Auto-ignition temperature**

- 440 °C Literature

**Decomposition temperature**

- No test data available

**Dynamic Viscosity**

- 1.02 mPa.s at 20 °C Literature

**Kinematic Viscosity**

- 1.04 mm²/s at 25 °C Estimated.

**Explosive properties**

- Not explosive

**Oxidizing properties**

- The substance or mixture is not classified as oxidizing.

#### 9.2 Other information

**Molecular weight**

- 74.08 g/mol Estimated.

**Molecular formula**

- C2 H5 COOH

**Note:** The physical data presented above are typical values and should not be construed as a specification.
SECTION 10: STABILITY AND REACTIVITY

10.1 Reactivity: No data available

10.2 Chemical stability: Stable.

10.3 Possibility of hazardous reactions: Polymerization will not occur.

10.4 Conditions to avoid: Exposure to elevated temperatures can cause product to decompose.

10.5 Incompatible materials: None known.

10.6 Hazardous decomposition products: Decomposition products depend upon temperature, air supply and the presence of other materials. Decomposition products can include and are not limited to: Carbon monoxide. Carbon dioxide. Ammonia. Amines.

SECTION 11: TOXICOLOGICAL INFORMATION

Toxicological information appears in this section when such data is available.

11.1 Information on toxicological effects

Acute toxicity

Acute oral toxicity
Low toxicity if swallowed. Swallowing may result in irritation or burns of the mouth, throat, and gastrointestinal tract.

LD50, Rat, male and female, 3,455 mg/kg OECD 401 or equivalent

Acute dermal toxicity
Prolonged skin contact is unlikely to result in absorption of harmful amounts.

LD50, Rat, female, 3,235 mg/kg

Acute inhalation toxicity
Brief exposure (minutes) is not likely to cause adverse effects. Excessive exposure may cause irritation to upper respiratory tract (nose and throat).

LC50, Rat, male and female, 4 Hour, vapour, > 20 mg/l OECD Test Guideline 403

Skin corrosion/irritation
Brief contact may cause skin burns. Symptoms may include pain, severe local redness and tissue damage.

Serious eye damage/eye irritation
May cause severe irritation with corneal injury which may result in permanent impairment of vision, even blindness. Chemical burns may occur. Vapor may cause eye irritation experienced as mild discomfort and redness.

Sensitization
Did not cause allergic skin reactions when tested in guinea pigs.

For respiratory sensitization:
No relevant data found.

**Specific Target Organ Systemic Toxicity (Single Exposure)**
The substance or mixture is not classified as specific target organ toxicant, single exposure.

**Specific Target Organ Systemic Toxicity (Repeated Exposure)**
In animals, effects have been reported on the following organs after ingestion:
Gastrointestinal tract.
Positive findings are believed to be secondary to chronic irritation/tissue injury.

**Carcinogenicity**
Propionic acid caused pre-cancerous changes in the stomachs of rats when ingested in large amounts. Positive findings are believed to be secondary to chronic irritation/tissue injury. Available data are inadequate to evaluate carcinogenicity.

**Teratogenicity**
Did not cause birth defects or any other fetal effects in laboratory animals.

**Reproductive toxicity**
In animal studies, did not interfere with reproduction.

**Mutagenicity**
In vitro genetic toxicity studies were negative. Animal genetic toxicity studies were negative.

**Aspiration Hazard**
Based on physical properties, not likely to be an aspiration hazard.

### SECTION 12: ECOLOGICAL INFORMATION

*Ecotoxicological information appears in this section when such data is available.*

**12.1 Toxicity**

**Acute toxicity to fish**
Material is harmful to aquatic organisms (LC50/EC50/IC50 between 10 and 100 mg/L in the most sensitive species).
May decrease pH of aquatic systems to < pH 5 which may be toxic to aquatic organisms.

Based on analogy.
LC50, Leuciscus idus (Golden orfe), static test, 96 Hour, > 1,000 mg/l, DIN 38412

**Acute toxicity to aquatic invertebrates**
Based on analogy.
EC50, Daphnia magna (Water flea), static test, 48 Hour, > 500 mg/l, OECD Test Guideline 202 or Equivalent

**Acute toxicity to algae/aquatic plants**
Based on analogy.
EbC50, Desmodesmus subspicatus (green algae), static test, 72 Hour, Biomass, > 500 mg/l, OECD Test Guideline 201

ErC50, Desmodesmus subspicatus (green algae), static test, 72 Hour, Growth rate inhibition, 48.7 mg/l

Toxicity to bacteria
Based on analogy.
Other, activated sludge, static test, 0.5 Hour, Respiration rates., 500 - 1,040 mg/l

EC50, Pseudomonas putida, static test, 17 Hour, Growth inhibition, 59.6 mg/l, DIN 38412

12.2 Persistence and degradability
Biodegradability: Material is expected to be readily biodegradable.

Biodegradation: 93 %
Exposure time: 20 d

12.3 Bioaccumulative potential
Bioaccumulation: Bioconcentration potential is low (BCF < 100 or Log Pow < 3).
Partition coefficient: n-octanol/water(log Pow): 0.33 Measured

12.4 Mobility in soil
Potential for mobility in soil is very high (Koc between 0 and 50).
Partition coefficient (Koc): 1.2 Estimated.

12.5 Results of PBT and vPvB assessment
This substance is not considered to be persistent, bioaccumulating and toxic (PBT). This substance is not considered to be very persistent and very bioaccumulating (vPvB).

12.6 Other adverse effects
This substance is not on the Montreal Protocol list of substances that deplete the ozone layer.

SECTION 13: DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods
This product, when being disposed of in its unused and uncontaminated state should be treated as a hazardous waste according to EC Directive 2008/98/EC. Any disposal practices must be in compliance with all national and provincial laws and any municipal or local by-laws governing hazardous waste. For used, contaminated and residual materials additional evaluations may be required. Do not dump into any sewers, on the ground, or into any body of water.

The definitive assignment of this material to the appropriate EWC group and thus its proper EWC code will depend on the use that is made of this material. Contact the authorized waste disposal services.

SECTION 14: TRANSPORT INFORMATION

Classification for ROAD and Rail transport (ADR/RID):
### PRODUCT INFORMATION

**Product name:** Propionic Acid  
**Revision Date:** 22.06.2017  
**Version:** 7.1

#### 14.1 UN number  
**UN 3463**

#### 14.2 UN proper shipping name  
**PROPIONIC ACID**

#### 14.3 Transport hazard class(es)  
8 (3)

#### 14.4 Packing group  
II

#### 14.5 Environmental hazards  
Not considered environmentally hazardous based on available data.

#### 14.6 Special precautions for user  
Hazard Identification Number: 83

### Classification for SEA transport (IMO-IMDG):

#### 14.1 UN number  
**UN 3463**

#### 14.2 UN proper shipping name  
**PROPIONIC ACID**

#### 14.3 Transport hazard class(es)  
8 (3)

#### 14.4 Packing group  
II

#### 14.5 Environmental hazards  
Not considered as marine pollutant based on available data.

#### 14.6 Special precautions for user  
EmS: F-E, S-C

#### 14.7 Transport in bulk according to Annex I or II of MARPOL 73/78 and the IBC or IGC Code  
Consult IMO regulations before transporting ocean bulk

### Classification for AIR transport (IATA/ICAO):

#### 14.1 UN number  
**UN 3463**

#### 14.2 UN proper shipping name  
Propionic acid

#### 14.3 Transport hazard class(es)  
8 (3)

#### 14.4 Packing group  
II

#### 14.5 Environmental hazards  
Not applicable

#### 14.6 Special precautions for user  
No data available.

---

This information is not intended to convey all specific regulatory or operational requirements/information relating to this product. Transportation classifications may vary by container volume and may be influenced by regional or country variations in regulations. Additional transportation system information can be obtained through an authorized sales or customer service representative. It is the responsibility of the transporting organization to follow all applicable laws, regulations and rules relating to the transportation of the material.

### SECTION 15: REGULATORY INFORMATION

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture
REACH Regulation (EC) No 1907/2006
This substance has been registered according to Regulation (EC) No. 1907/2006 (REACH). The aforementioned indications of the REACH registration status are provided in good faith and believed to be accurate as of the effective date shown above. However, no warranty, express or implied, is given. It is the buyer’s/user’s responsibility to ensure that his/her understanding of the regulatory status of this product is correct.

Listed in Regulation: FLAMMABLE LIQUIDS
Number in Regulation: P5c
5,000 t
50,000 t

15.2 Chemical safety assessment
A Chemical Safety Assessment has been carried out for this substance.

SECTION 16: OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.
H226 Flammable liquid and vapour.
H314 Causes severe skin burns and eye damage.
H318 Causes serious eye damage.
H335 May cause respiratory irritation.

Product Literature
Additional information on this product may be obtained by calling your sales or customer service contact. Additional information on this and other products may be obtained by visiting our web page.

Revision
Identification Number: 101234251 / A279 / Issue Date: 22.06.2017 / Version: 7.1
Most recent revision(s) are noted by the bold, double bars in left-hand margin throughout this document.

Legend

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACGIH</td>
<td>USA. American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Values (TLV)</td>
</tr>
<tr>
<td>Dow IHG</td>
<td>Dow Industrial Hygiene Guideline</td>
</tr>
<tr>
<td>GB EH40</td>
<td>UK. EH40 WEL - Workplace Exposure Limits</td>
</tr>
<tr>
<td>STEL</td>
<td>Short term exposure limit</td>
</tr>
<tr>
<td>TWA</td>
<td>Time weighted average</td>
</tr>
</tbody>
</table>

Information Source and References
This SDS is prepared by Product Regulatory Services and Hazard Communications Groups from information supplied by internal references within our company.
DOW CHEMICAL COMPANY LIMITED urges each customer or recipient of this (M)SDS to study it carefully and consult appropriate expertise, as necessary or appropriate, to become aware of and understand the data contained in this (M)SDS and any hazards associated with the product. The information herein is provided in good faith and believed to be accurate as of the effective date shown above. However, no warranty, express or implied, is given. Regulatory requirements are subject to change and may differ between various locations. It is the buyer's/user's responsibility to ensure that his activities comply with all federal, state, provincial or local laws. The information presented here pertains only to the product as shipped. Since conditions for use of the product are not under the control of the manufacturer, it is the buyer's/user's duty to determine the conditions necessary for the safe use of this product. Due to the proliferation of sources for information such as manufacturer-specific (M)SDSs, we are not and cannot be responsible for (M)SDSs obtained from any source other than ourselves. If you have obtained an (M)SDS from another source or if you are not sure that the (M)SDS you have is current, please contact us for the most current version.

| Main User Groups | SU 3: Industrial uses: Uses of substances as such or in preparations at industrial sites |
| Sectors of end-use | SU8, SU9: Manufacture of bulk, large scale chemicals (including petroleum products), Manufacture of fine chemicals |
| Process categories | PROC1: Use in closed process, no likelihood of exposure |
| | PROC3: Use in closed batch process (synthesis or formulation) |
| | PROC8a: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at non-dedicated facilities |
| | PROC8b: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities |
| | PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing) |
| | PROC15: Use as laboratory reagent |

Environmental Release Categories : ERC1: Manufacture of substances

2.1 Contributing scenario controlling environmental exposure for: ERC1: Manufacture of substances

Frequency and duration of use
Continuous exposure : 350 Emission days/year, Continuous release.

Environment factors not influenced by risk management
Dilution Factor (River) : 10

Other given operational conditions affecting environmental exposure
Emission or Release Factor: Air : 0.1 %
Emission or Release Factor: Water : 0.01 %
Emission or Release Factor: Soil : 0.1 %
Remarks : Indoor use

Technical conditions and measures / Organizational measures
Water : Sludge should be incinerated, contained or reclaimed.

Conditions and measures related to municipal sewage treatment plant
Sludge Treatment : Sludge should be incinerated, contained or reclaimed., Do not apply industrial sludge to natural soils.

2.2 Contributing scenario controlling worker exposure for: PROC1: Use in closed process, no likelihood of exposure

Activity : Use in closed process, no likelihood of exposure

Product characteristics
Concentration of the Substance in Mixture/Article : Covers the percentage of the substance in the product up to 100 % (unless stated differently).
2.3 Contributing scenario controlling worker exposure for: PROC3: Use in closed batch process (synthesis or formulation)

Activity : Use in closed batch process (synthesis or formulation)

Product characteristics
- Concentration of the Substance in Mixture/Article : Covers the percentage of the substance in the product up to 100 % (unless stated differently).
- Physical Form (at time of use) : Liquid, vapour pressure < 0.5 kPa at STP
- Frequency and duration of use
  Remarks : Covers daily exposures up to 8 hours (unless stated differently).

Other operational conditions affecting workers exposure
Remarks : Not applicable

Organisational measures to prevent /limit releases, dispersion and exposure
Not applicable

Conditions and measures related to personal protection, hygiene and health evaluation
Wear suitable gloves tested to EN374. (Effectiveness (of a measure): 80 %)

2.4 Contributing scenario controlling worker exposure for: PROC8a: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at non-dedicated facilities

Activity : Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at non-dedicated facilities

Product characteristics
- Concentration of the Substance in Mixture/Article : Covers the percentage of the substance in the product up to 100 % (unless stated differently).
- Physical Form (at time of use) : Liquid, vapour pressure < 0.5 kPa at STP
- Frequency and duration of use
  Remarks : Covers daily exposures up to 8 hours (unless stated differently).

Other operational conditions affecting workers exposure
Remarks : Not applicable
Technical conditions and measures
Ensure operation is undertaken outdoors.

Organisational measures to prevent/limit releases, dispersion and exposure
Not applicable

Conditions and measures related to personal protection, hygiene and health evaluation
Wear suitable gloves tested to EN374. (Effectiveness (of a measure): 80 %)

### 2.5 Contributing scenario controlling worker exposure for: PROC8a: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at non-dedicated facilities

| Activity | Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at non-dedicated facilities
|-----------|--------------------------------------------------|

#### Product characteristics

<table>
<thead>
<tr>
<th>Concentration of the Substance in Mixture/Article</th>
<th>Covers the percentage of the substance in the product up to 100 % (unless stated differently).</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical Form (at time of use)</td>
<td>Liquid, vapour pressure &lt; 0.5 kPa at STP</td>
</tr>
<tr>
<td>Remarks</td>
<td>Covers daily exposures up to 8 hours (unless stated differently).</td>
</tr>
</tbody>
</table>

#### Other operational conditions affecting workers exposure

<table>
<thead>
<tr>
<th>Remarks</th>
<th>Not applicable</th>
</tr>
</thead>
</table>

#### Technical conditions and measures

Provide extract ventilation to points where emissions occur (Effectiveness (of a measure): 30 %)

#### Conditions and measures related to personal protection, hygiene and health evaluation

Wear suitable gloves tested to EN374. (Effectiveness (of a measure): 80 %)

### 2.6 Contributing scenario controlling worker exposure for: PROC8b: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities

| Activity | Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities
|-----------|--------------------------------------------------|

#### Product characteristics

<table>
<thead>
<tr>
<th>Concentration of the Substance in Mixture/Article</th>
<th>Covers the percentage of the substance in the product up to 100 % (unless stated differently).</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical Form (at time of use)</td>
<td>Liquid, vapour pressure &lt; 0.5 kPa at STP</td>
</tr>
<tr>
<td>Remarks</td>
<td>Covers daily exposures up to 8 hours (unless stated differently).</td>
</tr>
</tbody>
</table>

#### Other operational conditions affecting workers exposure

<table>
<thead>
<tr>
<th>Remarks</th>
<th>Not applicable</th>
</tr>
</thead>
</table>


Organisational measures to prevent /limit releases, dispersion and exposure
Not applicable

Conditions and measures related to personal protection, hygiene and health evaluation
Wear suitable gloves tested to EN374. (Effectiveness (of a measure): 80 %)

2.7 Contributing scenario controlling worker exposure for: PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing)

Activity : Transfer of substance or preparation into small containers (dedicated filling line, including weighing)

Product characteristics
Concentration of the Substance in Mixture/Article : Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use) : Liquid, vapour pressure < 0.5 kPa at STP
Frequency and duration of use
Remarks : Covers daily exposures up to 8 hours (unless stated differently).

Other operational conditions affecting workers exposure
Remarks : Not applicable

Organisational measures to prevent /limit releases, dispersion and exposure
Not applicable

Conditions and measures related to personal protection, hygiene and health evaluation
Wear suitable gloves tested to EN374. (Effectiveness (of a measure): 80 %)

2.8 Contributing scenario controlling worker exposure for: PROC15: Use as laboratory reagent

Activity : Use as laboratory reagent

Product characteristics
Concentration of the Substance in Mixture/Article : Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use) : Liquid, vapour pressure < 0.5 kPa at STP
Frequency and duration of use
Remarks : Covers daily exposures up to 8 hours (unless stated differently).

Other operational conditions affecting workers exposure
Remarks : Not applicable

Organisational measures to prevent /limit releases, dispersion and exposure
Not applicable

Conditions and measures related to personal protection, hygiene and health evaluation
Wear suitable gloves tested to EN374. (Effectiveness (of a measure): 80 %)
### 3. Exposure estimation and reference to its source

#### Environment

<table>
<thead>
<tr>
<th>Contributing Scenario</th>
<th>Exposure Assessment Method</th>
<th>Specific conditions</th>
<th>Compartment</th>
<th>Value type</th>
<th>Level of Exposure</th>
<th>RCR</th>
</tr>
</thead>
<tbody>
<tr>
<td>ERC1</td>
<td>Used ECETOC TRA model.</td>
<td>Not applicable</td>
<td>Sediment</td>
<td>1.36 mg/l</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Fresh water</td>
<td>0.14 mg/l</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Fresh water sediment</td>
<td>0.52 mg/kg</td>
<td>dry weight (d.w.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Soil</td>
<td>0.02 mg/kg</td>
<td>dry weight (d.w.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sediment</td>
<td>0.3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Fresh water</td>
<td>0.3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Fresh water sediment</td>
<td>0.3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Soil</td>
<td>0.15</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Workers

<table>
<thead>
<tr>
<th>Contributing Scenario</th>
<th>Exposure Assessment Method</th>
<th>Specific conditions</th>
<th>Value type</th>
<th>Level of Exposure</th>
<th>RCR</th>
</tr>
</thead>
<tbody>
<tr>
<td>PROC1</td>
<td>ECETOC TRA v2.0 Worker</td>
<td>Use in closed process, no likelihood of exposure</td>
<td>Chronic inhalation systemic exposure</td>
<td>0.031 mg/m³</td>
<td>0.001</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Chronic dermal systemic exposure</td>
<td>0.343 mg/kg bw/day</td>
<td>0.025</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Combined routes</td>
<td>0.347 mg/kg bw/day</td>
<td>0.026</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Chronic dermal local exposure</td>
<td>0.100 mg/cm²</td>
<td>0.385</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Acute inhalation systemic exposure</td>
<td>0.0615 mg/m³</td>
<td>0.001</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Acute dermal systemic exposure</td>
<td>0.343 mg/kg bw/day</td>
<td>0.003</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Combined routes</td>
<td>0.343 mg/kg bw/day</td>
<td>0.004</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Acute dermal local exposure</td>
<td>0.100 mg/cm²</td>
<td>0.385</td>
</tr>
<tr>
<td>PROC3</td>
<td>ECETOC TRA v2.0 Worker</td>
<td>Use in closed batch process (synthesis or formulation)</td>
<td>Chronic inhalation systemic exposure</td>
<td>9.260 mg/m³</td>
<td>0.297</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Chronic dermal systemic exposure</td>
<td>0.343 mg/kg bw/day</td>
<td>0.025</td>
</tr>
<tr>
<td>PROC8a</td>
<td>ECETOC TRA v2.0 Worker</td>
<td>Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at non-dedicated facilities</td>
<td>Chronic inhalation systemic exposure</td>
<td>21.607 mg/m³</td>
<td>0.697</td>
</tr>
<tr>
<td>-----------------------------------------------</td>
<td>-------------------------------------------------</td>
<td>--------------------------------------------------------------------------------</td>
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<tr>
<td>Chronic dermal local exposure</td>
<td>0.100 mg/cm²</td>
<td></td>
<td>0.385</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acute inhalation systemic exposure</td>
<td>18.443 mg/m³</td>
<td></td>
<td>0.297</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acute dermal systemic exposure</td>
<td>0.343 mg/kg bw/day</td>
<td></td>
<td>0.025</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Combined routes</td>
<td>0.425 mg/kg bw/day</td>
<td></td>
<td>0.0197</td>
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</tr>
<tr>
<td>Acute dermal local exposure</td>
<td>0.100 mg/cm²</td>
<td></td>
<td>0.385</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>PROC8a</th>
<th>ECETOC TRA v2.0 Worker</th>
<th>Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at non-dedicated facilities</th>
<th>Chronic inhalation systemic exposure</th>
<th>21.607 mg/m³</th>
<th>0.697</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chronic dermal systemic exposure</td>
<td>1.371 mg/kg bw/day</td>
<td></td>
<td>0.010</td>
<td></td>
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</tr>
<tr>
<td>Combined routes</td>
<td>4.458 mg/kg bw/day</td>
<td></td>
<td>0.707</td>
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<tr>
<td>Chronic dermal local exposure</td>
<td>0.100 mg/cm²</td>
<td></td>
<td>0.385</td>
<td></td>
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</tr>
<tr>
<td>Acute inhalation systemic exposure</td>
<td>43.034 mg/m³</td>
<td></td>
<td>0.4694</td>
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<tr>
<td>Acute dermal systemic exposure</td>
<td>1.371 mg/kg bw/day</td>
<td></td>
<td>0.098</td>
<td></td>
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<tr>
<td>Combined routes</td>
<td>1.563 mg/kg bw/day</td>
<td></td>
<td>0.792</td>
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<tr>
<td>Acute dermal local exposure</td>
<td>0.100 mg/cm²</td>
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<td>0.385</td>
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<tr>
<td>Procedure</td>
<td>Work Scenario</td>
<td>Exposure Route</td>
<td>Exposure Type</td>
<td>Exposure Value</td>
<td></td>
</tr>
<tr>
<td>-----------</td>
<td>---------------</td>
<td>----------------</td>
<td>---------------</td>
<td>----------------</td>
<td></td>
</tr>
<tr>
<td>PROC8b ECETOC TRA v2.0 Worker</td>
<td>Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities</td>
<td>Chronic dermal systemic exposure</td>
<td>0.686 mg/kg bw/day</td>
<td>0.005</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Combined routes</td>
<td>2.890 mg/kg bw/day</td>
<td>0.503</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Chronic dermal local exposure</td>
<td>0.100 mg/cm²</td>
<td>0.385</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Acute inhalation systemic exposure</td>
<td>30.739 mg/m³</td>
<td>0.496</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Acute dermal systemic exposure</td>
<td>0.686 mg/kg bw/day</td>
<td>0.049</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Combined routes</td>
<td>0.823 mg/kg bw/day</td>
<td>0.545</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Acute dermal local exposure</td>
<td>0.100 mg/cm²</td>
<td>0.385</td>
<td></td>
<td></td>
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<tr>
<td>PROC9 ECETOC TRA v2.0 Worker</td>
<td>Transfer of substance or preparation into small containers (dedicated filling line, including weighing)</td>
<td>Chronic dermal systemic exposure</td>
<td>0.686 mg/kg bw/day</td>
<td>0.005</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Combined routes</td>
<td>2.890 mg/kg bw/day</td>
<td>0.503</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Chronic dermal local exposure</td>
<td>0.100 mg/cm²</td>
<td>0.385</td>
<td></td>
<td></td>
</tr>
<tr>
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<td>0.496</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Acute dermal systemic exposure</td>
<td>0.686 mg/kg bw/day</td>
<td>0.049</td>
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<td></td>
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<td>0.823 mg/kg bw/day</td>
<td>0.545</td>
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<td></td>
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<td></td>
<td>Acute dermal local exposure</td>
<td>0.100 mg/cm²</td>
<td>0.385</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PROC15 ECETOC TRA v2.0 Worker</td>
<td>Use as laboratory reagent</td>
<td>Chronic dermal systemic exposure</td>
<td>0.034 mg/kg bw/day</td>
<td>0.000</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Combined routes</td>
<td>2.548 mg/kg bw/day</td>
<td>0.498</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Chronic dermal local exposure</td>
<td>0.010 mg/cm²</td>
<td>0.385</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Acute inhalation systemic exposure</td>
<td>43.034 mg/m³</td>
<td>0.496</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario

Environment - Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures. Required removal efficiency for wastewater can be achieved using onsite/offsite technologies, either alone or in combination. Required removal efficiency for air can be achieved using on-site technologies, either alone or in combination. Further details on scaling and control technologies are provided in SpERC factsheet [http://cefic.org/en/reach-for-industries-libraries.html](http://cefic.org/en/reach-for-industries-libraries.html).

Health - Estimated workplace exposures are not expected to exceed DNELs when the identified risk management measures are adopted. Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

| Main User Groups | SU 3: Industrial uses: Uses of substances as such or in preparations at industrial sites |
| Sectors of end-use | SU 10: Formulation [mixing] of preparations and/ or re-packing (excluding alloys) |
| Process categories | PROC1: Use in closed process, no likelihood of exposure |
| | PROC3: Use in closed batch process (synthesis or formulation) |
| | PROC5: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/ or significant contact) |
| | PROC8a: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at non-dedicated facilities |
| | PROC8b: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities |
| | PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing) |
| | PROC15: Use as laboratory reagent |
| Environmental Release Categories | ERC2: Formulation of preparations |

2.1 Contributing scenario controlling environmental exposure for: ERC2: Formulation of preparations

Frequency and duration of use
Continuous exposure : 350 Emission days/year, Continuous release.

Environment factors not influenced by risk management
Dilution Factor (River) : 10
Dilution Factor (Coastal Areas) : 100

Other given operational conditions affecting environmental exposure
Emission or Release Factor: Air : 0.1 %
Emission or Release Factor: Water : 0.05 %
Emission or Release Factor: Soil : 0.1 %
Remarks : Indoor use

Technical conditions and measures / Organizational measures
Water : Sludge should be incinerated, contained or reclaimed.

Conditions and measures related to municipal sewage treatment plant
Sludge Treatment : Sludge should be incinerated, contained or reclaimed., Do not apply industrial sludge to natural soils.

2.2 Contributing scenario controlling worker exposure for: PROC1: Use in closed process, no likelihood of exposure

Activity : Use in closed process, no likelihood of exposure
**Product name:** Propionic Acid  
**Revision Date:** 22.06.2017  
**Version:** 7.1

### Product characteristics

<table>
<thead>
<tr>
<th><strong>Concentration of the Substance in Mixture/Article</strong></th>
<th>Covers the percentage of the substance in the product up to 100 % (unless stated differently).</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Physical Form (at time of use)</strong></td>
<td>Liquid, vapour pressure &lt; 0.5 kPa at STP</td>
</tr>
<tr>
<td><strong>Frequency and duration of use</strong></td>
<td>Covers daily exposures up to 8 hours (unless stated differently).</td>
</tr>
</tbody>
</table>

### Other operational conditions affecting workers exposure

| Remarks                                                                 | Not applicable |

### Organisational measures to prevent /limit releases, dispersion and exposure

No applicable

### Conditions and measures related to personal protection, hygiene and health evaluation

Wear suitable gloves tested to EN374. (Effectiveness (of a measure): 80 %)

#### 2.3 Contributing scenario controlling worker exposure for: PROC3: Use in closed batch process (synthesis or formulation)

| Activity                                                                 | Use in closed batch process (synthesis or formulation) |

### Product characteristics

<table>
<thead>
<tr>
<th><strong>Concentration of the Substance in Mixture/Article</strong></th>
<th>Covers the percentage of the substance in the product up to 100 % (unless stated differently).</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Physical Form (at time of use)</strong></td>
<td>Liquid, vapour pressure &lt; 0.5 kPa at STP</td>
</tr>
<tr>
<td><strong>Frequency and duration of use</strong></td>
<td>Covers daily exposures up to 8 hours (unless stated differently).</td>
</tr>
</tbody>
</table>

### Other operational conditions affecting workers exposure

| Remarks                                                                 | Not applicable |

### Organisational measures to prevent /limit releases, dispersion and exposure

No applicable

### Conditions and measures related to personal protection, hygiene and health evaluation

Wear suitable gloves tested to EN374. (Effectiveness (of a measure): 80 %)

#### 2.4 Contributing scenario controlling worker exposure for: PROC5: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/ or significant contact)

| Activity                                                                 | Mixing or blending in batch processes for formulation of preparations and articles (multistage and/ or significant contact) |

### Product characteristics

| **Concentration of the Substance in Mixture/Article** | Covers the percentage of the substance in the product up to 100 % (unless stated differently). |
Physical Form (at time of use): Liquid, vapour pressure < 0.5 kPa at STP

Frequency and duration of use
Remarks: Covers daily exposures up to 8 hours (unless stated differently).

Other operational conditions affecting workers exposure
Remarks: Not applicable

Organisational measures to prevent /limit releases, dispersion and exposure
Not applicable

Conditions and measures related to personal protection, hygiene and health evaluation
Wear suitable gloves tested to EN374. (Effectiveness (of a measure): 90 %)

2.5 Contributing scenario controlling worker exposure for: PROC8a: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at non-dedicated facilities

Activity
Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at non-dedicated facilities

Product characteristics
Concentration of the Substance in Mixture/Article
Covers the percentage of the substance in the product up to 100 % (unless stated differently).

Physical Form (at time of use)
Liquid, vapour pressure < 0.5 kPa at STP

Frequency and duration of use
Remarks
Covers daily exposures up to 8 hours (unless stated differently).

Other operational conditions affecting workers exposure
Remarks: Not applicable

Technical conditions and measures
Ensure operation is undertaken outdoors.

Organisational measures to prevent /limit releases, dispersion and exposure
Not applicable

Conditions and measures related to personal protection, hygiene and health evaluation
Wear suitable gloves tested to EN374. (Effectiveness (of a measure): 80 %)

2.6 Contributing scenario controlling worker exposure for: PROC8a: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at non-dedicated facilities

Activity
Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at non-dedicated facilities

Product characteristics
Concentration of the Substance in
Covers the percentage of the substance in the product up to
<table>
<thead>
<tr>
<th>Mixture/Article</th>
<th>100 % (unless stated differently).</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical Form (at time of use)</td>
<td>Liquid, vapour pressure &lt; 0.5 kPa at STP</td>
</tr>
<tr>
<td><strong>Frequency and duration of use</strong></td>
<td>Covers daily exposures up to 8 hours (unless stated differently).</td>
</tr>
<tr>
<td>Remarks</td>
<td></td>
</tr>
</tbody>
</table>

**Other operational conditions affecting workers exposure**
Remarks: Not applicable

**Technical conditions and measures**
Provide extract ventilation to points where emissions occur (Effectiveness of a measure): 30 %

**Conditions and measures related to personal protection, hygiene and health evaluation**
Wear suitable gloves tested to EN374. (Effectiveness of a measure): 80 %

2.7 Contributing scenario controlling worker exposure for: PROC8b: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities

<table>
<thead>
<tr>
<th>Activity</th>
<th>Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities</th>
</tr>
</thead>
</table>

**Product characteristics**
Concentration of the Substance in Mixture/Article: Covers the percentage of the substance in the product up to 100 % (unless stated differently).

Physical Form (at time of use): Liquid, vapour pressure < 0.5 kPa at STP

**Frequency and duration of use**
Remarks: Covers daily exposures up to 8 hours (unless stated differently).

**Other operational conditions affecting workers exposure**
Remarks: Not applicable

**Organisational measures to prevent /limit releases, dispersion and exposure**
Not applicable

**Conditions and measures related to personal protection, hygiene and health evaluation**
Wear suitable gloves tested to EN374. (Effectiveness of a measure): 80 %

2.8 Contributing scenario controlling worker exposure for: PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing)

<table>
<thead>
<tr>
<th>Activity</th>
<th>Transfer of substance or preparation into small containers (dedicated filling line, including weighing)</th>
</tr>
</thead>
</table>

**Product characteristics**
Concentration of the Substance in Mixture/Article: Covers the percentage of the substance in the product up to 100 % (unless stated differently).

Physical Form (at time of use): Liquid, vapour pressure < 0.5 kPa at STP

**Frequency and duration of use**
Remarks : Covers daily exposures up to 8 hours (unless stated differently).

Other operational conditions affecting workers exposure
Remarks : Not applicable

Organisational measures to prevent /limit releases, dispersion and exposure
Not applicable

Conditions and measures related to personal protection, hygiene and health evaluation
Wear suitable gloves tested to EN374. (Effectiveness (of a measure): 80 %)

2.9 Contributing scenario controlling worker exposure for: PROC15: Use as laboratory reagent

Product characteristics
Concentration of the Substance in Mixture/Article : Covers the percentage of the substance in the product up to 100 % (unless stated differently).

Physical Form (at time of use) : Liquid, vapour pressure < 0.5 kPa at STP

Frequency and duration of use
Remarks : Covers daily exposures up to 8 hours (unless stated differently).

Other operational conditions affecting workers exposure
Remarks : Not applicable

Organisational measures to prevent /limit releases, dispersion and exposure
Not applicable

Conditions and measures related to personal protection, hygiene and health evaluation
Wear suitable gloves tested to EN374. (Effectiveness (of a measure): 80 %)

2.10 Contributing scenario controlling worker exposure for: PROC2: Use in closed, continuous process with occasional controlled exposure

3. Exposure estimation and reference to its source

<table>
<thead>
<tr>
<th>Environment</th>
<th>Contributing Scenario</th>
<th>Exposure Assessment Method</th>
<th>Specific conditions</th>
<th>Compartiment</th>
<th>Value type</th>
<th>Level of Exposure</th>
<th>RCR</th>
</tr>
</thead>
<tbody>
<tr>
<td>ERC2</td>
<td>Used ECETOC TRA model</td>
<td>Not applicable</td>
<td>Sediment</td>
<td>2.53 mg/l</td>
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<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Fresh water</td>
<td>0.26 mg/l</td>
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<tr>
<td></td>
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<td></td>
<td>Fresh water sediment</td>
<td>0.96 mg/kg dry weight (d.w.)</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Soil</td>
<td>0.009 mg/kg dry weight (d.w.)</td>
<td>0.08</td>
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<tr>
<td>Contributing Scenario</td>
<td>Exposure Assessment Method</td>
<td>Specific conditions</td>
<td>Value type</td>
<td>Level of Exposure</td>
<td>RCR</td>
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<tr>
<td>-----------------------</td>
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<td>-----</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PROC1</td>
<td>ECETOC TRA v2.0 Worker</td>
<td>Use in closed process, no likelihood of exposure</td>
<td>Chronic inhalation systemic exposure</td>
<td>0.031 mg/m³</td>
<td>0.001</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Chronic dermal systemic exposure</td>
<td>0.343 mg/kg bw/day</td>
<td>0.025</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Combined routes</td>
<td>0.347 mg/kg bw/day</td>
<td>0.026</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Chronic dermal local exposure</td>
<td>0.100 mg/cm²</td>
<td>0.385</td>
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</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Acute inhalation systemic exposure</td>
<td>0.061 mg/m³</td>
<td>0.001</td>
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<td></td>
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<tr>
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<td></td>
<td>Acute dermal systemic exposure</td>
<td>0.343 mg/kg bw/day</td>
<td>0.003</td>
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</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Combined routes</td>
<td>0.343 mg/kg bw/day</td>
<td>0.004</td>
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<tr>
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<td></td>
<td></td>
<td>Acute dermal local exposure</td>
<td>0.100 mg/cm²</td>
<td>0.385</td>
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<td></td>
</tr>
<tr>
<td>PROC3</td>
<td>ECETOC TRA v2.0 Worker</td>
<td>Use in closed batch process (synthesis or formulation)</td>
<td>Chronic inhalation systemic exposure</td>
<td>9.260 mg/m³</td>
<td>0.001</td>
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<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Chronic dermal systemic exposure</td>
<td>0.343 mg/kg bw/day</td>
<td>0.025</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Combined routes</td>
<td>1.666 mg/kg bw/day</td>
<td>0.026</td>
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</tr>
<tr>
<td></td>
<td></td>
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<td>Chronic dermal local exposure</td>
<td>0.100 mg/cm²</td>
<td>0.385</td>
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<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Acute inhalation systemic exposure</td>
<td>18.443 mg/m³</td>
<td>0.001</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Acute dermal systemic exposure</td>
<td>0.343 mg/kg bw/day</td>
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<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Combined routes</td>
<td>0.425 mg/kg bw/day</td>
<td>0.004</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Acute dermal local exposure</td>
<td>0.100 mg/cm²</td>
<td>0.385</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PROC5</td>
<td>ECETOC TRA v2.0 Worker</td>
<td>Mixing or blending in batch processes for formulation of preparations and articles (multistage and/ or significant contact)</td>
<td>Chronic inhalation systemic exposure</td>
<td>15.433 mg/m³</td>
<td>0.001</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Chronic dermal systemic exposure</td>
<td>1.371 mg/kg bw/day</td>
<td>0.025</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Combined routes</td>
<td>3.576 mg/kg bw/day</td>
<td>0.026</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Chronic dermal</td>
<td>0.200 mg/cm²</td>
<td>0.385</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PROC8a</td>
<td>ECETOC TRA v2.0 Worker</td>
<td>Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities</td>
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<td></td>
<td></td>
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<tr>
<td>Combined routes</td>
<td>4.458 mg/kg bw/day</td>
<td>0.707</td>
<td></td>
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</tr>
<tr>
<td>Chronic dermal local exposure</td>
<td>0.100 mg/cm²</td>
<td>0.385</td>
<td></td>
<td></td>
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<tr>
<td>Acute inhalation systemic exposure</td>
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<td>0.4694</td>
<td></td>
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<tr>
<td>Acute dermal systemic exposure</td>
<td>1.371 mg/kg bw/day</td>
<td>0.098</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Combined routes</td>
<td>1.564 mg/kg bw/day</td>
<td>0.792</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Acute dermal local exposure</td>
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<td>0.385</td>
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<td></td>
</tr>
<tr>
<td>PROC8a</td>
<td>ECETOC TRA v2.0 Worker</td>
<td>Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities</td>
<td>Chronic inhalation systemic exposure</td>
<td>21.607 mg/m³</td>
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<tr>
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<td>4.458 mg/kg bw/day</td>
<td>0.707</td>
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<tr>
<td>Combined routes</td>
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<td>0.792</td>
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<tr>
<td>Acute dermal local exposure</td>
<td>0.100 mg/cm²</td>
<td>0.385</td>
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<tr>
<td>PROC8b</td>
<td>ECETOC TRA</td>
<td>Transfer of substance</td>
<td>Chronic inhalation</td>
<td>15.433 mg/m³</td>
<td>0.498</td>
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</tr>
<tr>
<td>v2.0 Worker</td>
<td>or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities</td>
<td>systemic exposure</td>
<td></td>
<td></td>
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<tr>
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<tr>
<td></td>
<td>Chronic dermal systemic exposure</td>
<td>0.686 mg/kg bw/day</td>
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<tr>
<td></td>
<td>Combined routes</td>
<td>2.890 mg/kg bw/day</td>
<td>0.503</td>
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<tr>
<td></td>
<td>Chronic dermal local exposure</td>
<td>0.100 mg/cm²</td>
<td>0.385</td>
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<tr>
<td></td>
<td>Acute inhalation systemic exposure</td>
<td>30.739 mg/m³</td>
<td>0.496</td>
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<tr>
<td></td>
<td>Acute dermal systemic exposure</td>
<td>0.686 mg/kg bw/day</td>
<td>0.049</td>
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<td></td>
<td>Combined routes</td>
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<td>0.545</td>
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<tr>
<td>PROC9</td>
<td>ECETOC TRA v2.0 Worker Transfer of substance or preparation into small containers (dedicated filling line, including weighing)</td>
<td>Chronic inhalation systemic exposure</td>
<td>15.433 mg/m³</td>
<td>0.498</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Chronic dermal systemic exposure</td>
<td>0.686 mg/kg bw/day</td>
<td>0.005</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td></td>
<td>Combined routes</td>
<td>2.890 mg/kg bw/day</td>
<td>0.503</td>
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<td></td>
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<td></td>
<td>Chronic dermal local exposure</td>
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<td>0.496</td>
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</tr>
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<td>Acute dermal systemic exposure</td>
<td>0.686 mg/kg bw/day</td>
<td>0.049</td>
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<td></td>
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<tr>
<td></td>
<td>Combined routes</td>
<td>0.823 mg/kg bw/day</td>
<td>0.545</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PROC15</td>
<td>ECETOC TRA v2.0 Worker Use as laboratory reagent</td>
<td>Chronic inhalation systemic exposure</td>
<td>1.543 mg/m³</td>
<td>0.498</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Chronic dermal systemic exposure</td>
<td>0.034 mg/kg bw/day</td>
<td>0.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Combined routes</td>
<td>2.548 mg/kg bw/day</td>
<td>0.498</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Chronic dermal local exposure</td>
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<td>0.385</td>
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<td>0.496</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td></td>
<td>Acute dermal systemic exposure</td>
<td>0.343 mg/kg bw/day</td>
<td>0.002</td>
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<tr>
<td></td>
<td>Combined routes</td>
<td>0.172 mg/kg</td>
<td>0.498</td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>
4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario

Environment - Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures. Required removal efficiency for wastewater can be achieved using onsite/offsite technologies, either alone or in combination. Required removal efficiency for air can be achieved using on-site technologies, either alone or in combination. Further details on scaling and control technologies are provided in SpERC factsheet http://cefic.org/en/reach-for-industries-libraries.html.

Health - Estimated workplace exposures are not expected to exceed DNELs when the identified risk management measures are adopted. Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

Main User Groups : SU 3: Industrial uses: Uses of substances as such or in preparations at industrial sites
Process categories : PROC15: Use as laboratory reagent
Environmental Release Categories : ERC4: Industrial use of processing aids in processes and products, not becoming part of articles

2.1 Contributing scenario controlling environmental exposure for: ERC4: Industrial use of processing aids in processes and products, not becoming part of articles

Amount used
Daily amount per site : 13.70 kg
Frequency and duration of use
Continuous exposure : 350 Emission days/year, Continuous release.

Environment factors not influenced by risk management
Dilution Factor (River) : 10
Dilution Factor (Coastal Areas) : 100

Other given operational conditions affecting environmental exposure
Emission or Release Factor: Air : 5 %
Emission or Release Factor: Water : 10 %
Emission or Release Factor: Soil : 0.01 %
Remarks : Indoor use

2.2 Contributing scenario controlling worker exposure for: PROC15: Use as laboratory reagent

Activity : Use as laboratory reagent

Product characteristics
Concentration of the Substance in Mixture/Article : Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use) : Liquid, vapour pressure < 0.5 kPa at STP
Frequency and duration of use
Remarks : Covers daily exposures up to 8 hours (unless stated differently).

Other operational conditions affecting workers exposure
Remarks : Not applicable

Technical conditions and measures
Provide extract ventilation to points where emissions occur

Organisational measures to prevent /limit releases, dispersion and exposure
Not applicable

Conditions and measures related to personal protection, hygiene and health evaluation
Wear suitable gloves tested to EN374. (Effectiveness (of a measure): 80 %)
3. Exposure estimation and reference to its source

<table>
<thead>
<tr>
<th>Environment</th>
<th>Exposure Assessment Method</th>
<th>Specific conditions</th>
<th>Compartment</th>
<th>Value type</th>
<th>Level of Exposure</th>
<th>RCR</th>
</tr>
</thead>
<tbody>
<tr>
<td>ERC4</td>
<td>Used ECETOC TRA model.</td>
<td>Not applicable</td>
<td>Fresh water</td>
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<td>Fresh water sediment</td>
<td>0.96 mg/kg dry weight (d.w.)</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Soil</td>
<td>0.01 mg/kg dry weight (d.w.)</td>
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<tr>
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<td>Marine water</td>
<td>0.2 mg/l</td>
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<td>Marine sediment</td>
<td>0.75 mg/kg dry weight (d.w.)</td>
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</table>

<table>
<thead>
<tr>
<th>Workers</th>
<th>Exposure Assessment Method</th>
<th>Specific conditions</th>
<th>Value type</th>
<th>Level of Exposure</th>
<th>RCR</th>
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</thead>
<tbody>
<tr>
<td>PROC15</td>
<td>ECETOC TRA v2.0 Worker</td>
<td>Use as laboratory reagent</td>
<td>Chronic inhalation systemic exposure</td>
<td>1.543 mg/m³</td>
<td>0.498</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Chronic dermal systemic exposure</td>
<td>0.034 mg/kg bw/day</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Combined routes</td>
<td>0.255 mg/kg bw/day</td>
<td>0.498</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Chronic dermal local exposure</td>
<td>0.010 mg/cm²</td>
<td>0.385</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Acute inhalation systemic exposure</td>
<td>30.739 mg/m³</td>
<td>0.496</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Acute dermal systemic exposure</td>
<td>0.343 mg/kg bw/day</td>
<td>0.002</td>
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<td></td>
<td></td>
<td></td>
<td>Combined routes</td>
<td>0.172 mg/kg bw/day</td>
<td>0.498</td>
</tr>
<tr>
<td></td>
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<td></td>
<td>Acute dermal local exposure</td>
<td>0.010 mg/cm²</td>
<td>0.385</td>
</tr>
</tbody>
</table>

4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario

Environment - Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures. Further details on scaling and control technologies are provided in SpERC factsheet http://cefic.org/en/reach-for-industries-libraries.html. No additional risk management measures required.
Health - Estimated workplace exposures are not expected to exceed DNELs when the identified risk management measures are adopted. Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.
1. Short title of Exposure Scenario: Use in laboratories, professional.

<table>
<thead>
<tr>
<th>Main User Groups</th>
<th>SU 22: Professional uses: Public domain (administration, education, entertainment, services, craftsmen)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Process categories</td>
<td>PROC15: Use as laboratory reagent</td>
</tr>
<tr>
<td>Environmental Release Categories</td>
<td>ERC8a: Wide dispersive indoor use of processing aids in open systems</td>
</tr>
</tbody>
</table>

2.1 Contributing scenario controlling environmental exposure for: ERC8a: Wide dispersive indoor use of processing aids in open systems

<table>
<thead>
<tr>
<th>Frequency and duration of use</th>
<th>Continuous release.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environment factors not influenced by risk management</td>
<td>Remarks: Not applicable</td>
</tr>
</tbody>
</table>

2.2 Contributing scenario controlling worker exposure for: PROC15: Use as laboratory reagent

<table>
<thead>
<tr>
<th>Activity</th>
<th>Use as laboratory reagent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product characteristics</td>
<td></td>
</tr>
<tr>
<td>Concentration of the Substance in Mixture/Article</td>
<td>Covers the percentage of the substance in the product up to 100 % (unless stated differently).</td>
</tr>
<tr>
<td>Physical Form (at time of use)</td>
<td>Liquid, vapour pressure &lt; 0.5 kPa at STP</td>
</tr>
<tr>
<td>Frequency and duration of use</td>
<td></td>
</tr>
<tr>
<td>Remarks</td>
<td>Covers daily exposures up to 8 hours (unless stated differently).</td>
</tr>
<tr>
<td>Other operational conditions affecting workers exposure</td>
<td>Remarks: Not applicable</td>
</tr>
<tr>
<td>Technical conditions and measures</td>
<td>Provide extract ventilation to points where emissions occur</td>
</tr>
<tr>
<td>Organisational measures to prevent /limit releases, dispersion and exposure</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Conditions and measures related to personal protection, hygiene and health evaluation</td>
<td>Wear suitable gloves tested to EN374. (Effectiveness (of a measure): 80 %)</td>
</tr>
</tbody>
</table>

3. Exposure estimation and reference to its source

<table>
<thead>
<tr>
<th>Environment</th>
<th>Contributing Scenario</th>
<th>Exposure Assessment Method</th>
<th>Specific conditions</th>
<th>Compartment</th>
<th>Value type</th>
<th>Level of Exposure</th>
<th>RCR</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ERC8a</td>
<td>Used ECETOC</td>
<td>Not</td>
<td>Fresh water</td>
<td>0.008 mg/l</td>
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</table>
### TRA model. applicable

<table>
<thead>
<tr>
<th></th>
<th>Fresh water sediment</th>
<th>Soil</th>
<th>Marine water</th>
<th>Marine sediment</th>
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<td><strong>TRA model.</strong></td>
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<tr>
<td><strong>applicable</strong></td>
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<tr>
<td><strong>Value type</strong></td>
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<td>0.003 mg/kg dry weight (d.w.)</td>
<td>0.0008 mg/l</td>
<td>0.003 mg/kg dry weight (d.w.)</td>
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<td><strong>Level of Exposure</strong></td>
<td>0.015</td>
<td>0.05</td>
<td>0.03</td>
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</table>

### Workers

<table>
<thead>
<tr>
<th>Contributing Scenario</th>
<th>Exposure Assessment Method</th>
<th>Specific conditions</th>
<th>Value type</th>
<th>Level of Exposure</th>
<th>RCR</th>
</tr>
</thead>
<tbody>
<tr>
<td>PROC15</td>
<td>ECETOC TRA v2.0 Worker</td>
<td>Use as laboratory reagent</td>
<td>Chronic inhalation systemic exposure</td>
<td>3.087 mg/m³</td>
<td>0.498</td>
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<td>0.034 mg/kg bw/day</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Combined routes</td>
<td>0.475 mg/kg bw/day</td>
<td>0.498</td>
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<tr>
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<td>Chronic dermal local exposure</td>
<td>0.010 mg/cm²</td>
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<td></td>
<td></td>
<td>Acute inhalation systemic exposure</td>
<td>30.739 mg/m³</td>
<td>0.496</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Acute dermal systemic exposure</td>
<td>0.343 mg/kg bw/day</td>
<td>0.002</td>
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<td>Combined routes</td>
<td>0.172 mg/kg bw/day</td>
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<tr>
<td></td>
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<td>Acute dermal local exposure</td>
<td>0.010 mg/cm²</td>
<td>0.385</td>
</tr>
</tbody>
</table>

### 4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario

Environment - Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures. Further details on scaling and control technologies are provided in SpERC factsheet http://cefic.org/en/reach-for-industries-libraries.html. No additional risk management measures required.

Health - Estimated workplace exposures are not expected to exceed DNELs when the identified risk management measures are adopted. Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

Main User Groups : SU 3: Industrial uses: Uses of substances as such or in preparations at industrial sites
Sectors of end-use : SU8: Manufacture of bulk, large scale chemicals (including petroleum products)
Process categories : PROC1: Use in closed process, no likelihood of exposure
PROC2: Use in closed, continuous process with occasional controlled exposure
PROC3: Use in closed batch process (synthesis or formulation)
PROC4: Use in batch and other process (synthesis) where opportunity for exposure arises
PROC5: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/ or significant contact)
PROC8a: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at non-dedicated facilities
PROC8b: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities
PROC15: Use as laboratory reagent

Environmental Release Categories : ERC6a: Industrial use resulting in manufacture of another substance (use of intermediates)

2.1 Contributing scenario controlling environmental exposure for: ERC6a: Industrial use resulting in manufacture of another substance (use of intermediates)

Amount used
Daily amount per site : 13.70 kg

Frequency and duration of use
Continuous exposure : 350 Emission days/year, Continuous release.

Environment factors not influenced by risk management
Dilution Factor (River) : 10
Dilution Factor (Coastal Areas) : 100

Other given operational conditions affecting environmental exposure
Emission or Release Factor: Air : 5 %
Emission or Release Factor: Water : 10 %
Emission or Release Factor: Soil : 0.1 %

2.2 Contributing scenario controlling worker exposure for: PROC1: Use in closed process, no likelihood of exposure

Activity : Use in closed process, no likelihood of exposure

Product characteristics
Concentration of the Substance in : Covers the percentage of the substance in the product up to
Product name: Propionic Acid
Revision Date: 22.06.2017
Version: 7.1

<table>
<thead>
<tr>
<th>Mixture/Article</th>
<th>100 % (unless stated differently).</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical Form (at time of use)</td>
<td>Liquid, vapour pressure &lt; 0.5 kPa at STP</td>
</tr>
<tr>
<td>Frequency and duration of use</td>
<td>Covers daily exposures up to 8 hours (unless stated differently).</td>
</tr>
<tr>
<td>Remarks</td>
<td></td>
</tr>
</tbody>
</table>

Other operational conditions affecting workers exposure
Remarks : Not applicable

Organisational measures to prevent /limit releases, dispersion and exposure
Not applicable

Conditions and measures related to personal protection, hygiene and health evaluation
Wear suitable gloves tested to EN374. (Effectiveness (of a measure): 80 %)

2.3 Contributing scenario controlling worker exposure for: PROC2: Use in closed, continuous process with occasional controlled exposure

<table>
<thead>
<tr>
<th>Activity</th>
<th>Use in closed, continuous process with occasional controlled exposure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product characteristics</td>
<td></td>
</tr>
<tr>
<td>Concentration of the Substance in Mixture/Article</td>
<td>Covers the percentage of the substance in the product up to 100 % (unless stated differently).</td>
</tr>
<tr>
<td>Physical Form (at time of use)</td>
<td>Liquid, vapour pressure &lt; 0.5 kPa at STP</td>
</tr>
<tr>
<td>Frequency and duration of use</td>
<td>Covers daily exposures up to 8 hours (unless stated differently).</td>
</tr>
<tr>
<td>Remarks</td>
<td></td>
</tr>
</tbody>
</table>

Other operational conditions affecting workers exposure
Remarks : Not applicable

Organisational measures to prevent /limit releases, dispersion and exposure
Not applicable

Conditions and measures related to personal protection, hygiene and health evaluation
Wear suitable gloves tested to EN374. (Effectiveness (of a measure): 80 %)

2.4 Contributing scenario controlling worker exposure for: PROC3: Use in closed batch process (synthesis or formulation)

<table>
<thead>
<tr>
<th>Activity</th>
<th>Use in closed batch process (synthesis or formulation)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product characteristics</td>
<td></td>
</tr>
<tr>
<td>Concentration of the Substance in Mixture/Article</td>
<td>Covers the percentage of the substance in the product up to 100 % (unless stated differently).</td>
</tr>
<tr>
<td>Physical Form (at time of use)</td>
<td>Liquid, vapour pressure &lt; 0.5 kPa at STP</td>
</tr>
<tr>
<td>Frequency and duration of use</td>
<td>Covers daily exposures up to 8 hours (unless stated differently).</td>
</tr>
<tr>
<td>Remarks</td>
<td></td>
</tr>
</tbody>
</table>

Other operational conditions affecting workers exposure
Remarks : Not applicable

Organisational measures to prevent /limit releases, dispersion and exposure
Not applicable

Conditions and measures related to personal protection, hygiene and health evaluation
Wear suitable gloves tested to EN374. (Effectiveness (of a measure): 80 %)
## Other operational conditions affecting workers exposure

**Remarks**: Not applicable

## Organisational measures to prevent /limit releases, dispersion and exposure

Not applicable

## Conditions and measures related to personal protection, hygiene and health evaluation

Wear suitable gloves tested to EN374. (Effectiveness (of a measure): 80 %)

### 2.5 Contributing scenario controlling worker exposure for: PROC4: Use in batch and other process (synthesis) where opportunity for exposure arises

<table>
<thead>
<tr>
<th>Activity</th>
<th>Use in batch and other process (synthesis) where opportunity for exposure arises</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Product characteristics</strong></td>
<td></td>
</tr>
<tr>
<td>Concentration of the Substance in Mixture/Article</td>
<td>Covers the percentage of the substance in the product up to 100 % (unless stated differently).</td>
</tr>
<tr>
<td>Physical Form (at time of use)</td>
<td>Liquid, vapour pressure &lt; 0.5 kPa at STP</td>
</tr>
<tr>
<td><strong>Frequency and duration of use</strong></td>
<td></td>
</tr>
<tr>
<td>Remarks</td>
<td>Covers daily exposures up to 8 hours (unless stated differently).</td>
</tr>
</tbody>
</table>

## Other operational conditions affecting workers exposure

**Remarks**: Not applicable

## Organisational measures to prevent /limit releases, dispersion and exposure

Not applicable

## Conditions and measures related to personal protection, hygiene and health evaluation

Wear suitable gloves tested to EN374. (Effectiveness (of a measure): 80 %)

### 2.6 Contributing scenario controlling worker exposure for: PROC5: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/ or significant contact)

<table>
<thead>
<tr>
<th>Activity</th>
<th>Mixing or blending in batch processes for formulation of preparations and articles (multistage and/ or significant contact)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Product characteristics</strong></td>
<td></td>
</tr>
<tr>
<td>Concentration of the Substance in Mixture/Article</td>
<td>Covers the percentage of the substance in the product up to 100 % (unless stated differently).</td>
</tr>
<tr>
<td>Physical Form (at time of use)</td>
<td>Liquid, vapour pressure &lt; 0.5 kPa at STP</td>
</tr>
<tr>
<td><strong>Frequency and duration of use</strong></td>
<td></td>
</tr>
<tr>
<td>Remarks</td>
<td>Covers daily exposures up to 8 hours (unless stated differently).</td>
</tr>
</tbody>
</table>

## Other operational conditions affecting workers exposure
Remarks : Not applicable

Organisational measures to prevent /limit releases, dispersion and exposure
Not applicable

Conditions and measures related to personal protection, hygiene and health evaluation
Wear suitable gloves tested to EN374. (Effectiveness (of a measure): 80 %)

2.7 Contributing scenario controlling worker exposure for: PROC8a: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at non-dedicated facilities

Activity : Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at non-dedicated facilities

Product characteristics
Concentration of the Substance in Mixture/Article : Covers the percentage of the substance in the product up to 100 % (unless stated differently).

Physical Form (at time of use) : Liquid, vapour pressure < 0.5 kPa at STP

Frequency and duration of use
Remarks : Covers daily exposures up to 8 hours (unless stated differently).

Other operational conditions affecting workers exposure
Remarks : Not applicable

Technical conditions and measures
Ensure operation is undertaken outdoors.

Organisational measures to prevent /limit releases, dispersion and exposure
Not applicable

Conditions and measures related to personal protection, hygiene and health evaluation
Wear suitable gloves tested to EN374. (Effectiveness (of a measure): 80 %)

2.8 Contributing scenario controlling worker exposure for: PROC8b: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities

Activity : Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities

Product characteristics
Concentration of the Substance in Mixture/Article : Covers the percentage of the substance in the product up to 100 % (unless stated differently).

Physical Form (at time of use) : Liquid, vapour pressure < 0.5 kPa at STP

Frequency and duration of use
Remarks : Covers daily exposures up to 8 hours (unless stated differently).
Remarks : Not applicable

Organisational measures to prevent /limit releases, dispersion and exposure
Not applicable

Conditions and measures related to personal protection, hygiene and health evaluation
Wear suitable gloves tested to EN374. (Effectiveness (of a measure): 80 %)

2.9 Contributing scenario controlling worker exposure for: PROC15: Use as laboratory reagent

Activity : Use as laboratory reagent

Product characteristics
Concentration of the Substance in Mixture/Article : Covers the percentage of the substance in the product up to 100 % (unless stated differently).

Physical Form (at time of use) : Liquid, vapour pressure < 0.5 kPa at STP

Frequency and duration of use
Remarks : Covers daily exposures up to 8 hours (unless stated differently).

Other operational conditions affecting workers exposure
Remarks : Not applicable

Organisational measures to prevent /limit releases, dispersion and exposure
Not applicable

Conditions and measures related to personal protection, hygiene and health evaluation
Wear suitable gloves tested to EN374. (Effectiveness (of a measure): 80 %)

2.10 Contributing scenario controlling worker exposure for: PROC8a: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at non-dedicated facilities

Product characteristics
Concentration of the Substance in Mixture/Article : Covers the percentage of the substance in the product up to 100 % (unless stated differently).

Physical Form (at time of use) : Liquid, vapour pressure < 0.5 kPa at STP

Frequency and duration of use
Remarks : Covers daily exposures up to 8 hours (unless stated differently).

Other operational conditions affecting workers exposure
Remarks : Not applicable

Technical conditions and measures
Provide extract ventilation to points where emissions occur (Effectiveness (of a measure): 30 %)

Organisational measures to prevent /limit releases, dispersion and exposure
Not applicable
Conditions and measures related to personal protection, hygiene and health evaluation

Wear suitable gloves tested to EN374. (Effectiveness (of a measure): 80 %)

### 3. Exposure estimation and reference to its source

#### Environment

<table>
<thead>
<tr>
<th>Contributing Scenario</th>
<th>Exposure Assessment Method</th>
<th>Specific conditions</th>
<th>Compartment</th>
<th>Value type</th>
<th>Level of Exposure</th>
<th>RCR</th>
</tr>
</thead>
<tbody>
<tr>
<td>ERC6a</td>
<td>Used ECETOC TRA model.</td>
<td>Not applicable</td>
<td>Fresh water</td>
<td>0.4 mg/l</td>
<td>0.77</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Fresh water sediment</td>
<td>1.43 mg/l</td>
<td>0.77</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Soil</td>
<td>0.013 mg/kg dry weight (d.w.)</td>
<td>0.1</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Marine water</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Marine sediment</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Workers

<table>
<thead>
<tr>
<th>Contributing Scenario</th>
<th>Exposure Assessment Method</th>
<th>Specific conditions</th>
<th>Value type</th>
<th>Level of Exposure</th>
<th>RCR</th>
</tr>
</thead>
<tbody>
<tr>
<td>PROC1</td>
<td>ECETOC TRA v2.0 Worker</td>
<td>Use in closed process, no likelihood of exposure</td>
<td>Chronic inhalation systemic exposure</td>
<td>0.031 mg/m³</td>
<td>0.001</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Chronic dermal systemic exposure</td>
<td>0.343 mg/kg bw/day</td>
<td>0.025</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Combined routes</td>
<td>0.347 mg/kg bw/day</td>
<td>0.026</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Chronic dermal local exposure</td>
<td>0.100 mg/cm²</td>
<td>0.385</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Acute inhalation systemic exposure</td>
<td>0.0615 mg/m³</td>
<td>0.001</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Acute dermal systemic exposure</td>
<td>0.343 mg/kg bw/day</td>
<td>0.003</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Combined routes</td>
<td>0.343 mg/kg bw/day</td>
<td>0.004</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Acute dermal local exposure</td>
<td>0.100 mg/cm²</td>
<td>0.385</td>
</tr>
<tr>
<td>PROC2</td>
<td>ECETOC TRA v2.0 Worker</td>
<td>Use in closed, continuous process with occasional controlled exposure</td>
<td>Chronic inhalation systemic exposure</td>
<td>3.087 mg/m³</td>
<td>0.099</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Chronic dermal systemic exposure</td>
<td>1.371 mg/kg bw/day</td>
<td>0.010</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Combined routes</td>
<td>1.812 mg/kg bw/day</td>
<td>0.109</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Chronic dermal local exposure</td>
<td>0.200 mg/cm²</td>
<td>0.769</td>
</tr>
<tr>
<td>Procedure</td>
<td>Scenario</td>
<td>Description</td>
<td>Acute Inhalation Systemic Exposure</td>
<td>Chronic Inhalation Systemic Exposure</td>
<td></td>
</tr>
<tr>
<td>-----------</td>
<td>----------</td>
<td>-------------</td>
<td>-----------------------------------</td>
<td>-------------------------------------</td>
<td></td>
</tr>
<tr>
<td>PROC3</td>
<td>ECETOC TRA v2.0 Worker</td>
<td>Use in closed batch process (synthesis or formulation)</td>
<td>6.148 mg/m³</td>
<td>9.260 mg/m³</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Acute dermal systemic exposure</td>
<td>1.371 mg/kg bw/day</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Combined routes</td>
<td>1.398 mg/kg bw/day</td>
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<td></td>
<td></td>
<td>Acute dermal local exposure</td>
<td>0.200 mg/cm²</td>
<td></td>
</tr>
<tr>
<td>PROC4</td>
<td>ECETOC TRA v2.0 Worker</td>
<td>Use in batch and other process (synthesis) where opportunity for exposure arises</td>
<td>15.433 mg/m³</td>
<td>18.443 mg/m³</td>
<td></td>
</tr>
<tr>
<td></td>
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<td></td>
<td>Acute dermal systemic exposure</td>
<td>0.343 mg/kg bw/day</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Combined routes</td>
<td>1.666 mg/kg bw/day</td>
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</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Acute dermal local exposure</td>
<td>0.100 mg/cm²</td>
<td></td>
</tr>
<tr>
<td>PROC5</td>
<td>ECETOC TRA v2.0 Worker</td>
<td>Mixing or blending in batch processes for formulation of preparations and articles (multistage and/ or significant contact)</td>
<td>15.433 mg/m³</td>
<td>30.738 mg/m³</td>
<td></td>
</tr>
<tr>
<td></td>
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<td></td>
<td>Acute dermal systemic exposure</td>
<td>0.686 mg/kg bw/day</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Combined routes</td>
<td>2.890 mg/kg bw/day</td>
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<td>Acute dermal local exposure</td>
<td>0.100 mg/cm²</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Chronic dermal systemic exposure</td>
<td>1.371 mg/kg</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.010</td>
<td></td>
</tr>
<tr>
<td>Systemic Exposure</td>
<td>bw/day</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-------------------</td>
<td>--------</td>
<td>---</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Combined routes</td>
<td>3.576 mg/kg bw/day</td>
<td>0.508</td>
<td></td>
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<tr>
<td>Chronic dermal</td>
<td>0.200 mg/cm²</td>
<td>0.769</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acute inhalation</td>
<td>30.739 mg/m³</td>
<td>0.496</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acute dermal</td>
<td>1.371 mg/kg bw/day</td>
<td>0.098</td>
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<tr>
<td>Combined routes</td>
<td>1.509 mg/kg bw/day</td>
<td>0.594</td>
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<tr>
<td>Acute dermal local exposure</td>
<td>0.200 mg/cm²</td>
<td>0.769</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PROC8a</th>
<th>ECETOC TRA v2.0 Worker</th>
<th>Transfer of substance or preparation (charging/ discharging) from/to vessels/large containers at non-dedicated facilities</th>
<th>Chronic inhalation systemic exposure</th>
<th>21.607 mg/m³</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Chronic dermal systemic exposure</td>
<td>1.371 mg/kg bw/day</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Combined routes</td>
<td>4.458 mg/kg bw/day</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Chronic dermal local exposure</td>
<td>0.100 mg/cm²</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Acute inhalation systemic exposure</td>
<td>43.034 mg/m³</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Acute dermal systemic exposure</td>
<td>1.371 mg/kg bw/day</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Combined routes</td>
<td>1.564 mg/kg bw/day</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Acute dermal local exposure</td>
<td>0.100 mg/cm²</td>
<td></td>
</tr>
</tbody>
</table>

| PROC8b | ECETOC TRA v2.0 Worker | Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities | Chronic inhalation systemic exposure | 15.433 mg/m³ | 0.498 |
|--------|------------------------|-----------------------------------------------------------------|-----------------------------------|--------------|
|        |                        | Chronic dermal systemic exposure                                | 0.686 mg/kg bw/day                | 0.0005       |
|        |                        | Combined routes                                                  | 2.890 mg/kg bw/day                | 0.503        |
|        |                        | Chronic dermal local exposure                                    | 0.100 mg/cm²                      | 0.385        |
|        |                        | Acute inhalation systemic exposure                               | 30.739 mg/m³                      | 0.496        |
|        |                        | Acute dermal systemic exposure                                   | 0.686 mg/kg bw/day                | 0.049        |
|        |                        | Combined routes                                                  | 0.823 mg/kg                       | 0.545        |
### 4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario

Environment - Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures. Further details on scaling and control technologies are provided in SpERC factsheet [http://cefic.org/en/reach-for-industries-libraries.html](http://cefic.org/en/reach-for-industries-libraries.html). No additional risk management measures required.

Health - Estimated workplace exposures are not expected to exceed DNELs when the identified risk management measures are adopted. Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.
1. Short title of Exposure Scenario: Polymer processing, industrial.

Main User Groups : SU 3: Industrial uses: Uses of substances as such or in preparations at industrial sites

Sectors of end-use : SU 10: Formulation [mixing] of preparations and/or repackaging (excluding alloys)

Process categories : PROC1: Use in closed process, no likelihood of exposure
PROC2: Use in closed, continuous process with occasional controlled exposure
PROC3: Use in closed batch process (synthesis or formulation)
PROC4: Use in batch and other process (synthesis) where opportunity for exposure arises
PROC5: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)
PROC6: Calendering operations
PROC8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities
PROC8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities
PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing)
PROC14: Production of preparations or articles by tableting, compression, extrusion, pelletisation

Environmental Release Categories : ERC6d: Industrial use of process regulators for polymerisation processes in production of resins, rubbers, polymers

2.1 Contributing scenario controlling environmental exposure for: ERC6d: Industrial use of process regulators for polymerisation processes in production of resins, rubbers, polymers

Frequency and duration of use
Continuous exposure : Continuous release.

Environment factors not influenced by risk management
Remarks : Not applicable

2.2 Contributing scenario controlling worker exposure for: PROC1: Use in closed process, no likelihood of exposure

Activity : Use in closed process, no likelihood of exposure

Product characteristics
Concentration of the Substance in Mixture/Article : Covers the percentage of the substance in the product up to 100% (unless stated differently).

Physical Form (at time of use) : Liquid, vapour pressure < 0.5 kPa at STP
Product name: Propionic Acid

Revision Date: 22.06.2017
Version: 7.1

Frequency and duration of use
Remarks: Covers daily exposures up to 8 hours (unless stated differently).

Other operational conditions affecting workers exposure
Remarks: Not applicable

Organisational measures to prevent /limit releases, dispersion and exposure
Not applicable

Conditions and measures related to personal protection, hygiene and health evaluation
Wear suitable gloves tested to EN374. (Effectiveness (of a measure): 80 %)

2.3 Contributing scenario controlling worker exposure for: PROC2: Use in closed, continuous process with occasional controlled exposure

Activity: Use in closed, continuous process with occasional controlled exposure

Product characteristics
Concentration of the Substance in Mixture/Article: Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use): Liquid, vapour pressure < 0.5 kPa at STP

Frequency and duration of use
Remarks: Covers daily exposures up to 8 hours (unless stated differently).

Other operational conditions affecting workers exposure
Remarks: Not applicable

Organisational measures to prevent /limit releases, dispersion and exposure
Not applicable

Conditions and measures related to personal protection, hygiene and health evaluation
Wear suitable gloves tested to EN374. (Effectiveness (of a measure): 80 %)

2.4 Contributing scenario controlling worker exposure for: PROC3: Use in closed batch process (synthesis or formulation)

Activity: Use in closed batch process (synthesis or formulation)

Product characteristics
Concentration of the Substance in Mixture/Article: Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use): Liquid, vapour pressure < 0.5 kPa at STP

Frequency and duration of use
Remarks: Covers daily exposures up to 8 hours (unless stated differently).

Other operational conditions affecting workers exposure
### Product name: Propionic Acid

**Remarks**: Not applicable

#### Organisational measures to prevent /limit releases, dispersion and exposure
Not applicable

#### Conditions and measures related to personal protection, hygiene and health evaluation
Wear suitable gloves tested to EN374. (Effectiveness (of a measure): 80 %)

### 2.5 Contributing scenario controlling worker exposure for: PROC4: Use in batch and other process (synthesis) where opportunity for exposure arises

<table>
<thead>
<tr>
<th>Activity</th>
<th>Use in batch and other process (synthesis) where opportunity for exposure arises</th>
</tr>
</thead>
</table>

#### Product characteristics

<table>
<thead>
<tr>
<th>Concentration of the Substance in Mixture/Article</th>
<th>Covers the percentage of the substance in the product up to 100 % (unless stated differently).</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical Form (at time of use)</td>
<td>Liquid, vapour pressure &lt; 0.5 kPa at STP</td>
</tr>
</tbody>
</table>

#### Frequency and duration of use

<table>
<thead>
<tr>
<th>Remarks</th>
<th>Covers daily exposures up to 8 hours (unless stated differently).</th>
</tr>
</thead>
</table>

#### Other operational conditions affecting workers exposure

<table>
<thead>
<tr>
<th>Remarks</th>
<th>Not applicable</th>
</tr>
</thead>
</table>

#### Organisational measures to prevent /limit releases, dispersion and exposure
Not applicable

#### Conditions and measures related to personal protection, hygiene and health evaluation
Wear suitable gloves tested to EN374. (Effectiveness (of a measure): 80 %)

### 2.6 Contributing scenario controlling worker exposure for: PROC5: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)

<table>
<thead>
<tr>
<th>Activity</th>
<th>Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)</th>
</tr>
</thead>
</table>

#### Product characteristics

<table>
<thead>
<tr>
<th>Concentration of the Substance in Mixture/Article</th>
<th>Covers the percentage of the substance in the product up to 100 % (unless stated differently).</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical Form (at time of use)</td>
<td>Liquid, vapour pressure &lt; 0.5 kPa at STP</td>
</tr>
</tbody>
</table>

#### Frequency and duration of use

<table>
<thead>
<tr>
<th>Remarks</th>
<th>Covers daily exposures up to 8 hours (unless stated differently).</th>
</tr>
</thead>
</table>

#### Other operational conditions affecting workers exposure

<table>
<thead>
<tr>
<th>Remarks</th>
<th>Not applicable</th>
</tr>
</thead>
</table>

#### Organisational measures to prevent /limit releases, dispersion and exposure
Not applicable

**Conditions and measures related to personal protection, hygiene and health evaluation**
Wear suitable gloves tested to EN374. (Effectiveness (of a measure): 80 %)

<table>
<thead>
<tr>
<th><strong>2.7 Contributing scenario controlling worker exposure for: PROC6: Calendering operations</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Activity</strong></td>
</tr>
</tbody>
</table>

**Product characteristics**

<table>
<thead>
<tr>
<th>Concentration of the Substance in Mixture/Article</th>
<th>Covers the percentage of the substance in the product up to 100 % (unless stated differently).</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical Form (at time of use)</td>
<td>Liquid, vapour pressure &lt; 0.5 kPa at STP</td>
</tr>
</tbody>
</table>

**Frequency and duration of use**

| Remarks | Covers daily exposures up to 8 hours (unless stated differently). |

**Other operational conditions affecting workers exposure**

| Remarks | Not applicable |

**Organisational measures to prevent /limit releases, dispersion and exposure**
Not applicable

**Conditions and measures related to personal protection, hygiene and health evaluation**
Wear suitable gloves tested to EN374. (Effectiveness (of a measure): 80 %)

<table>
<thead>
<tr>
<th><strong>2.8 Contributing scenario controlling worker exposure for: PROC8a: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at non-dedicated facilities</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Activity</strong></td>
</tr>
</tbody>
</table>

**Product characteristics**

<table>
<thead>
<tr>
<th>Concentration of the Substance in Mixture/Article</th>
<th>Covers the percentage of the substance in the product up to 100 % (unless stated differently).</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical Form (at time of use)</td>
<td>Liquid, vapour pressure &lt; 0.5 kPa at STP</td>
</tr>
</tbody>
</table>

**Frequency and duration of use**

| Remarks | Covers daily exposures up to 8 hours (unless stated differently). |

**Other operational conditions affecting workers exposure**

| Remarks | Not applicable |

**Technical conditions and measures**
Ensure operation is undertaken outdoors.

**Organisational measures to prevent /limit releases, dispersion and exposure**
Not applicable
Conditions and measures related to personal protection, hygiene and health evaluation
Wear suitable gloves tested to EN374. (Effectiveness (of a measure): 80 %)

2.9 Contributing scenario controlling worker exposure for: PROC8b: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities

<table>
<thead>
<tr>
<th>Activity</th>
<th>Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities</th>
</tr>
</thead>
</table>

Product characteristics
| Concentration of the Substance in Mixture/Article | Covers the percentage of the substance in the product up to 100 % (unless stated differently). |
| Physical Form (at time of use) | Liquid, vapour pressure < 0.5 kPa at STP |

Frequency and duration of use
| Remarks | Covers daily exposures up to 8 hours (unless stated differently). |

Other operational conditions affecting workers exposure
| Remarks | Not applicable |

Organisational measures to prevent /limit releases, dispersion and exposure
Not applicable

Conditions and measures related to personal protection, hygiene and health evaluation
Wear suitable gloves tested to EN374. (Effectiveness (of a measure): 80 %)

2.10 Contributing scenario controlling worker exposure for: PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing)

<table>
<thead>
<tr>
<th>Activity</th>
<th>Transfer of substance or preparation into small containers (dedicated filling line, including weighing)</th>
</tr>
</thead>
</table>

Product characteristics
| Concentration of the Substance in Mixture/Article | Covers the percentage of the substance in the product up to 100 % (unless stated differently). |
| Physical Form (at time of use) | Liquid, vapour pressure < 0.5 kPa at STP |

Frequency and duration of use
| Remarks | Covers daily exposures up to 8 hours (unless stated differently). |

Other operational conditions affecting workers exposure
| Remarks | Not applicable |

Organisational measures to prevent /limit releases, dispersion and exposure
Not applicable

Conditions and measures related to personal protection, hygiene and health evaluation
Wear suitable gloves tested to EN374. (Effectiveness (of a measure): 80 %)
2.11 Contributing scenario controlling worker exposure for: PROC14: Production of preparations or articles by tabletting, compression, extrusion, pelletisation

<table>
<thead>
<tr>
<th>Activity</th>
<th>Production of preparations or articles by tabletting, compression, extrusion, pelletisation</th>
</tr>
</thead>
</table>

**Product characteristics**

<table>
<thead>
<tr>
<th>Concentration of the Substance in Mixture/Article</th>
<th>Covers the percentage of the substance in the product up to 100 % (unless stated differently).</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Physical Form (at time of use)</th>
<th>Liquid, vapour pressure &lt; 0.5 kPa at STP</th>
</tr>
</thead>
</table>

**Frequency and duration of use**

<table>
<thead>
<tr>
<th>Remarks</th>
<th>Covers daily exposures up to 8 hours (unless stated differently).</th>
</tr>
</thead>
</table>

**Other operational conditions affecting workers exposure**

<table>
<thead>
<tr>
<th>Remarks</th>
<th>Not applicable</th>
</tr>
</thead>
</table>

**Organisational measures to prevent /limit releases, dispersion and exposure**

Not applicable

**Conditions and measures related to personal protection, hygiene and health evaluation**

Wear suitable gloves tested to EN374. (Effectiveness (of a measure): 80 %)

2.12 Contributing scenario controlling worker exposure for: PROC8a: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at non-dedicated facilities

<table>
<thead>
<tr>
<th>Activity</th>
<th>Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at non-dedicated facilities</th>
</tr>
</thead>
</table>

**Product characteristics**

<table>
<thead>
<tr>
<th>Concentration of the Substance in Mixture/Article</th>
<th>Covers the percentage of the substance in the product up to 100 % (unless stated differently).</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Physical Form (at time of use)</th>
<th>Liquid, vapour pressure &lt; 0.5 kPa at STP</th>
</tr>
</thead>
</table>

**Frequency and duration of use**

<table>
<thead>
<tr>
<th>Remarks</th>
<th>Covers daily exposures up to 8 hours (unless stated differently).</th>
</tr>
</thead>
</table>

**Other operational conditions affecting workers exposure**

<table>
<thead>
<tr>
<th>Remarks</th>
<th>Not applicable</th>
</tr>
</thead>
</table>

**Technical conditions and measures**

Provide extract ventilation to points where emissions occur (Effectiveness (of a measure): 30 %)

**Organisational measures to prevent /limit releases, dispersion and exposure**

Not applicable

**Conditions and measures related to personal protection, hygiene and health evaluation**

Wear suitable gloves tested to EN374. (Effectiveness (of a measure): 80 %)
### 3. Exposure estimation and reference to its source

#### Environment

<table>
<thead>
<tr>
<th>Contributing Scenario</th>
<th>Exposure Assessment Method</th>
<th>Specific conditions</th>
<th>Compartment</th>
<th>Value type</th>
<th>Level of Exposure</th>
<th>RCR</th>
</tr>
</thead>
<tbody>
<tr>
<td>ERC6d</td>
<td>Used ECETOC TRA model.</td>
<td>Not applicable</td>
<td>Fresh water</td>
<td>0.006 mg/l</td>
<td>0.015</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Fresh water sediment</td>
<td>0.023 mg/kg dry weight (d.w.)</td>
<td>0.015</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Soil</td>
<td>0.01 mg/kg dry weight (d.w.)</td>
<td>0.1</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Marine water</td>
<td>0.0006 mg/l</td>
<td>0.015</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Marine sediment</td>
<td>0.002 mg/kg dry weight (d.w.)</td>
<td>0.015</td>
<td></td>
</tr>
</tbody>
</table>

#### Workers

<table>
<thead>
<tr>
<th>Contributing Scenario</th>
<th>Exposure Assessment Method</th>
<th>Specific conditions</th>
<th>Value type</th>
<th>Level of Exposure</th>
<th>RCR</th>
</tr>
</thead>
<tbody>
<tr>
<td>PROC1</td>
<td>ECETOC TRA v2.0 Worker</td>
<td>Use in closed process, no likelihood of exposure</td>
<td>Chronic inhalation systemic exposure</td>
<td>0.031 mg/m³</td>
<td>0.001</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Chronic dermal systemic exposure</td>
<td>0.343 mg/kg bw/day</td>
<td>0.025</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Combined routes</td>
<td>0.347 mg/kg bw/day</td>
<td>0.026</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Chronic dermal local exposure</td>
<td>0.100 mg/cm²</td>
<td>0.385</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Acute inhalation systemic exposure</td>
<td>0.061 mg/m³</td>
<td>0.001</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Acute dermal systemic exposure</td>
<td>0.343 mg/kg bw/day</td>
<td>0.003</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Combined routes</td>
<td>0.343 mg/kg bw/day</td>
<td>0.004</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Acute dermal local exposure</td>
<td>0.100 mg/cm²</td>
<td>0.385</td>
</tr>
<tr>
<td>PROC2</td>
<td>ECETOC TRA v2.0 Worker</td>
<td>Use in closed, continuous process with occasional controlled exposure</td>
<td>Chronic inhalation systemic exposure</td>
<td>3.087 mg/m³</td>
<td>0.099</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Chronic dermal systemic exposure</td>
<td>1.371 mg/kg bw/day</td>
<td>0.010</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Combined routes</td>
<td>1.812 mg/kg bw/day</td>
<td>0.109</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Chronic dermal local exposure</td>
<td>0.200 mg/cm²</td>
<td>0.769</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Acute inhalation</td>
<td>6.148 mg/m³</td>
<td>0.099</td>
</tr>
<tr>
<td>Process</td>
<td>Exposure Route</td>
<td>Activity</td>
<td>Exposure Type</td>
<td>Calculated Value</td>
<td></td>
</tr>
<tr>
<td>---------</td>
<td>---------------</td>
<td>----------</td>
<td>---------------</td>
<td>-----------------</td>
<td></td>
</tr>
<tr>
<td>PROC3 ECETOC TRA v2.0 Worker</td>
<td>Use in closed batch process (synthesis or formulation)</td>
<td>Acute dermal local exposure</td>
<td>0.200 mg/cm²</td>
<td>0.769</td>
<td></td>
</tr>
<tr>
<td>PROC3 ECETOC TRA v2.0 Worker</td>
<td>Use in closed batch process (synthesis or formulation)</td>
<td>Chronic inhalation systemic exposure</td>
<td>9.260 mg/m³</td>
<td>0.297</td>
<td></td>
</tr>
<tr>
<td>PROC3 ECETOC TRA v2.0 Worker</td>
<td>Use in closed batch process (synthesis or formulation)</td>
<td>Chronic dermal systemic exposure</td>
<td>0.343 mg/kg bw/day</td>
<td>0.025</td>
<td></td>
</tr>
<tr>
<td>PROC3 ECETOC TRA v2.0 Worker</td>
<td>Use in closed batch process (synthesis or formulation)</td>
<td>Combined routes</td>
<td>1.398 mg/kg bw/day</td>
<td>0.0197</td>
<td></td>
</tr>
<tr>
<td>PROC3 ECETOC TRA v2.0 Worker</td>
<td>Use in closed batch process (synthesis or formulation)</td>
<td>Combined routes</td>
<td>1.666 mg/kg bw/day</td>
<td>0.322</td>
<td></td>
</tr>
<tr>
<td>PROC3 ECETOC TRA v2.0 Worker</td>
<td>Use in closed batch process (synthesis or formulation)</td>
<td>Chronic dermal local exposure</td>
<td>0.100 mg/cm²</td>
<td>0.385</td>
<td></td>
</tr>
<tr>
<td>PROC3 ECETOC TRA v2.0 Worker</td>
<td>Use in closed batch process (synthesis or formulation)</td>
<td>Acute inhalation systemic exposure</td>
<td>18.443 mg/m³</td>
<td>0.297</td>
<td></td>
</tr>
<tr>
<td>PROC3 ECETOC TRA v2.0 Worker</td>
<td>Use in closed batch process (synthesis or formulation)</td>
<td>Acute dermal systemic exposure</td>
<td>0.343 mg/kg bw/day</td>
<td>0.025</td>
<td></td>
</tr>
<tr>
<td>PROC3 ECETOC TRA v2.0 Worker</td>
<td>Use in closed batch process (synthesis or formulation)</td>
<td>Combined routes</td>
<td>0.425 mg/kg bw/day</td>
<td>0.0197</td>
<td></td>
</tr>
<tr>
<td>PROC4 ECETOC TRA v2.0 Worker</td>
<td>Use in batch and other process (synthesis) where opportunity for exposure arises</td>
<td>Acute dermal local exposure</td>
<td>0.100 mg/cm²</td>
<td>0.385</td>
<td></td>
</tr>
<tr>
<td>PROC4 ECETOC TRA v2.0 Worker</td>
<td>Use in batch and other process (synthesis) where opportunity for exposure arises</td>
<td>Chronic inhalation systemic exposure</td>
<td>15.433 mg/m³</td>
<td>0.498</td>
<td></td>
</tr>
<tr>
<td>PROC4 ECETOC TRA v2.0 Worker</td>
<td>Use in batch and other process (synthesis) where opportunity for exposure arises</td>
<td>Chronic dermal systemic exposure</td>
<td>0.686 mg/kg bw/day</td>
<td>0.005</td>
<td></td>
</tr>
<tr>
<td>PROC4 ECETOC TRA v2.0 Worker</td>
<td>Use in batch and other process (synthesis) where opportunity for exposure arises</td>
<td>Combined routes</td>
<td>2.890 mg/kg bw/day</td>
<td>0.503</td>
<td></td>
</tr>
<tr>
<td>PROC4 ECETOC TRA v2.0 Worker</td>
<td>Use in batch and other process (synthesis) where opportunity for exposure arises</td>
<td>Chronic dermal local exposure</td>
<td>0.100 mg/cm²</td>
<td>0.385</td>
<td></td>
</tr>
<tr>
<td>PROC4 ECETOC TRA v2.0 Worker</td>
<td>Use in batch and other process (synthesis) where opportunity for exposure arises</td>
<td>Acute inhalation systemic exposure</td>
<td>30.739 mg/m³</td>
<td>0.498</td>
<td></td>
</tr>
<tr>
<td>PROC4 ECETOC TRA v2.0 Worker</td>
<td>Use in batch and other process (synthesis) where opportunity for exposure arises</td>
<td>Acute dermal systemic exposure</td>
<td>0.686 mg/kg bw/day</td>
<td>0.049</td>
<td></td>
</tr>
<tr>
<td>PROC4 ECETOC TRA v2.0 Worker</td>
<td>Use in batch and other process (synthesis) where opportunity for exposure arises</td>
<td>Combined routes</td>
<td>0.8229 mg/kg bw/day</td>
<td>0.0197</td>
<td></td>
</tr>
<tr>
<td>PROC4 ECETOC TRA v2.0 Worker</td>
<td>Use in batch and other process (synthesis) where opportunity for exposure arises</td>
<td>Acute dermal local exposure</td>
<td>0.100 mg/cm²</td>
<td>0.385</td>
<td></td>
</tr>
<tr>
<td>PROC5 ECETOC TRA v2.0 Worker</td>
<td>Mixing or blending in batch processes for formulation of preparations and articles (multistage and/ or significant contact)</td>
<td>Chronic inhalation systemic exposure</td>
<td>15.433 mg/m³</td>
<td>0.498</td>
<td></td>
</tr>
<tr>
<td>PROC5 ECETOC TRA v2.0 Worker</td>
<td>Mixing or blending in batch processes for formulation of preparations and articles (multistage and/ or significant contact)</td>
<td>Chronic dermal systemic exposure</td>
<td>1.371 mg/kg bw/day</td>
<td>0.010</td>
<td></td>
</tr>
<tr>
<td>Procedure</td>
<td>Model</td>
<td>Task Details</td>
<td>Exposure Route</td>
<td>Exposure Level</td>
<td>Source</td>
</tr>
<tr>
<td>------------</td>
<td>--------</td>
<td>------------------------------------------------------------------------------</td>
<td>----------------</td>
<td>----------------</td>
<td>--------</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Combined routes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Chronic dermal exposure</td>
<td>0.200 mg/cm²</td>
<td>0.769</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Acute inhalation systemic exposure</td>
<td>30.739 mg/m³</td>
<td>0.496</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Acute dermal systemic exposure</td>
<td>1.371 mg/kg bw/day</td>
<td>0.098</td>
<td></td>
</tr>
<tr>
<td>PROC6</td>
<td>ECETOC TRA v2.0 Worker</td>
<td>Calendering operations</td>
<td>Chronic inhalation systemic exposure</td>
<td>15.433 mg/m³</td>
<td>0.498</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Chronic dermal systemic exposure</td>
<td>2.743 mg/kg bw/day</td>
<td>0.021</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Combined routes</td>
<td>4.948 mg/kg bw/day</td>
<td>0.519</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Chronic dermal local exposure</td>
<td>0.200 mg/cm²</td>
<td>0.385</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Acute inhalation systemic exposure</td>
<td>30.739 mg/m³</td>
<td>0.498</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Acute dermal systemic exposure</td>
<td>1.371 mg/kg bw/day</td>
<td>0.021</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Combined routes</td>
<td>2.880 mg/kg bw/day</td>
<td>0.0519</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Acute dermal local exposure</td>
<td>0.200 mg/cm²</td>
<td>0.385</td>
<td></td>
</tr>
<tr>
<td>PROC8a</td>
<td>ECETOC TRA v2.0 Worker</td>
<td>Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at non-dedicated facilities</td>
<td>Chronic inhalation systemic exposure</td>
<td>21.607 mg/m³</td>
<td>0.697</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Chronic dermal systemic exposure</td>
<td>1.371 mg/kg bw/day</td>
<td>0.010</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Combined routes</td>
<td>4.458 mg/kg bw/day</td>
<td>0.707</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Chronic dermal local exposure</td>
<td>0.100 mg/cm²</td>
<td>0.385</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Acute inhalation systemic exposure</td>
<td>43.034 mg/m³</td>
<td>0.4694</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Acute dermal systemic exposure</td>
<td>1.371 mg/kg bw/day</td>
<td>0.098</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Combined routes</td>
<td>1.564 mg/kg bw/day</td>
<td>0.792</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Acute dermal local exposure</td>
<td>0.100 mg/cm²</td>
<td>0.385</td>
<td></td>
</tr>
<tr>
<td>PROC8b</td>
<td>ECETOC TRA v2.0 Worker</td>
<td>Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at non-dedicated facilities</td>
<td>Chronic inhalation systemic exposure</td>
<td>15.433 mg/m³</td>
<td>0.498</td>
</tr>
</tbody>
</table>

**Note:** The table above lists exposure levels and routes for various procedures involving the use of Propionic Acid. Each entry includes the exposure route, exposure level, source, and reference.
<table>
<thead>
<tr>
<th>PROC</th>
<th>ECETOC TRA v2.0 Worker</th>
<th>Activity</th>
<th>Chronic inhalation systemic exposure</th>
<th>Value</th>
<th>Uncertainty factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRO9</td>
<td>Transfer of substance or preparation into small containers (dedicated filling line, including weighing)</td>
<td>15.433 mg/m³</td>
<td>0.498</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Discharging) from/to vessels/large containers at dedicated facilities</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td></td>
<td>Chronic dermal systemic exposure</td>
<td>0.686 mg/kg bw/day</td>
<td>0.005</td>
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<tr>
<td></td>
<td>Combined routes</td>
<td>2.890 mg/kg bw/day</td>
<td>0.503</td>
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<tr>
<td></td>
<td>Chronic dermal local exposure</td>
<td>0.100 mg/cm²</td>
<td>0.385</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Acute inhalation systemic exposure</td>
<td>30.739 mg/m³</td>
<td>0.496</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Acute dermal systemic exposure</td>
<td>0.686 mg/kg bw/day</td>
<td>0.049</td>
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<tr>
<td></td>
<td>Combined routes</td>
<td>0.823 mg/kg bw/day</td>
<td>0.545</td>
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<td>Acute dermal local exposure</td>
<td>0.100 mg/cm²</td>
<td>0.385</td>
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</tr>
<tr>
<td>PRO14</td>
<td>Production of preparations or articles by tabletting, compression, extrusion, pelletisation</td>
<td>1.543 mg/m³</td>
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<td>Chronic dermal systemic exposure</td>
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<td></td>
<td>Acute inhalation systemic exposure</td>
<td>30.739 mg/m³</td>
<td>0.496</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Acute dermal systemic exposure</td>
<td>0.343 mg/kg bw/day</td>
<td>0.024</td>
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</tbody>
</table>
### 4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario

Environment - Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures. Further details on scaling and control technologies are provided in SpERC factsheet http://cefic.org/en/reach-for-industries-libraries.html. No additional risk management measures required.

Health - Estimated workplace exposures are not expected to exceed DNELs when the identified risk management measures are adopted. Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.
1. Short title of Exposure Scenario: Polymer processing, professional.

Main User Groups: SU 22: Professional uses: Public domain (administration, education, entertainment, services, craftsmen)

Process categories:
- PROC1: Use in closed process, no likelihood of exposure
- PROC2: Use in closed, continuous process with occasional controlled exposure
- PROC8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities
- PROC8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities
- PROC14: Production of preparations or articles by tabletting, compression, extrusion, pelletisation

Environmental Release Categories: ERC8a, ERC8c, ERC8d, ERC8f: Wide dispersive indoor use of processing aids in open systems, Wide dispersive indoor use resulting in inclusion into or onto a matrix, Wide dispersive outdoor use of processing aids in open systems, Wide dispersive outdoor use resulting in inclusion into or onto a matrix

2.1 Contributing scenario controlling environmental exposure for: ERC8a, ERC8c, ERC8d, ERC8f: Wide dispersive indoor use of processing aids in open systems, Wide dispersive indoor use resulting in inclusion into or onto a matrix, Wide dispersive outdoor use of processing aids in open systems, Wide dispersive outdoor use resulting in inclusion into or onto a matrix

Frequency and duration of use
Continuous exposure: Continuous release.

Environment factors not influenced by risk management
Remarks: Not applicable

2.2 Contributing scenario controlling worker exposure for: PROC1: Use in closed process, no likelihood of exposure

Activity: Use in closed process, no likelihood of exposure

Product characteristics
- Concentration of the Substance in Mixture/Article: Covers the percentage of the substance in the product up to 100 % (unless stated differently).
- Physical Form (at time of use): Liquid, vapour pressure < 0.5 kPa at STP

Frequency and duration of use
Remarks: Covers daily exposures up to 8 hours (unless stated differently).

Other operational conditions affecting workers exposure
Organisational measures to prevent /limit releases, dispersion and exposure
Not applicable

Conditions and measures related to personal protection, hygiene and health evaluation
Wear suitable gloves tested to EN374. (Effectiveness (of a measure): 80 %)

2.3 Contributing scenario controlling worker exposure for: PROC2: Use in closed, continuous process with occasional controlled exposure

<table>
<thead>
<tr>
<th>Activity</th>
<th>Use in closed, continuous process with occasional controlled exposure</th>
</tr>
</thead>
</table>

Product characteristics
Concentration of the Substance in Mixture/Article: Covers the percentage of the substance in the product up to 100 % (unless stated differently).

Physical Form (at time of use): Liquid, vapour pressure < 0.5 kPa at STP

Frequency and duration of use
Remarks: Covers daily exposures up to 8 hours (unless stated differently).

Other operational conditions affecting workers exposure
Remarks: Not applicable

Technical conditions and measures
Provide extract ventilation to points where emissions occur

Organisational measures to prevent /limit releases, dispersion and exposure
Not applicable

Conditions and measures related to personal protection, hygiene and health evaluation
Wear suitable gloves tested to EN374. (Effectiveness (of a measure): 80 %)

2.4 Contributing scenario controlling worker exposure for: PROC8a: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at non-dedicated facilities

<table>
<thead>
<tr>
<th>Activity</th>
<th>Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at non-dedicated facilities</th>
</tr>
</thead>
</table>

Product characteristics
Concentration of the Substance in Mixture/Article: Covers the percentage of the substance in the product up to 100 % (unless stated differently).

Physical Form (at time of use): Liquid, vapour pressure < 0.5 kPa at STP

Frequency and duration of use
Remarks: Covers daily exposures up to 8 hours (unless stated differently).

Other operational conditions affecting workers exposure
Remarks : Not applicable

Technical conditions and measures
Provide extract ventilation to points where emissions occur

Organisational measures to prevent /limit releases, dispersion and exposure
Not applicable

Conditions and measures related to personal protection, hygiene and health evaluation
Wear suitable gloves tested to EN374. (Effectiveness (of a measure): 80 %)
If above technical/organisational control measures are not feasible, then adopt following PPE:; Wear respiratory protection. (Effectiveness (of a measure): 90 %)

2.5 Contributing scenario controlling worker exposure for: PROC8b: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities

<table>
<thead>
<tr>
<th>Activity</th>
<th>Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities</th>
</tr>
</thead>
</table>

Product characteristics
Concentration of the Substance in Mixture/Article : Covers the percentage of the substance in the product up to 100 % (unless stated differently).

Physical Form (at time of use) : Liquid, vapour pressure < 0.5 kPa at STP

Frequency and duration of use
Remarks : Covers daily exposures up to 8 hours (unless stated differently).

Other operational conditions affecting workers exposure
Remarks : Not applicable

Technical conditions and measures
Provide extract ventilation to points where emissions occur

Organisational measures to prevent /limit releases, dispersion and exposure
Not applicable

Conditions and measures related to personal protection, hygiene and health evaluation
Wear suitable gloves tested to EN374. (Effectiveness (of a measure): 80 %)

2.6 Contributing scenario controlling worker exposure for: PROC14: Production of preparations or articles by tabletting, compression, extrusion, pelletisation

<table>
<thead>
<tr>
<th>Activity</th>
<th>Production of preparations or articles by tabletting, compression, extrusion, pelletisation</th>
</tr>
</thead>
</table>

Product characteristics
Concentration of the Substance in : Covers the percentage of the substance in the product up to
**Product name: Propionic Acid**

**Revision Date:** 22.06.2017  
**Version:** 7.1

**Mixture/Article:** 100 % (unless stated differently).

**Physical Form (at time of use):** Liquid, vapour pressure < 0.5 kPa at STP

**Frequency and duration of use:** Covers daily exposures up to 8 hours (unless stated differently).

**Remarks:**

**Other operational conditions affecting workers exposure**

**Remarks:** Not applicable

**Technical conditions and measures**

Provide extract ventilation to points where emissions occur

**Organisational measures to prevent /limit releases, dispersion and exposure**

Not applicable

**Conditions and measures related to personal protection, hygiene and health evaluation**

Wear suitable gloves tested to EN374. (Effectiveness (of a measure): 80 %)

### 3. Exposure estimation and reference to its source

<table>
<thead>
<tr>
<th>Environment</th>
<th>Contributing Scenario</th>
<th>Exposure Assessment Method</th>
<th>Specific conditions</th>
<th>Compartments</th>
<th>Value type</th>
<th>Level of Exposure</th>
<th>RCR</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ERC8a</td>
<td>Used ECETOC TRA model.</td>
<td>Not applicable</td>
<td>Fresh water</td>
<td>0.008 mg/l</td>
<td>0.02</td>
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</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Fresh water sediment</td>
<td>0.03 mg/kg dry weight (d.w.)</td>
<td>0.02</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Soil</td>
<td>0.003 mg/kg dry weight (d.w.)</td>
<td>0.05</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Marine water</td>
<td>0.0008 mg/l</td>
<td>0.02</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ERC8c</td>
<td>Used ECETOC TRA model.</td>
<td>Not applicable</td>
<td>Fresh water</td>
<td>0.005 mg/l</td>
<td>0.013</td>
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</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Fresh water sediment</td>
<td>0.02 mg/kg dry weight (d.w.)</td>
<td>0.013</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Soil</td>
<td>0.003 mg/kg dry weight (d.w.)</td>
<td>0.05</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Marine water</td>
<td>0.0005 mg/l</td>
<td>0.012</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Marine sediment</td>
<td>0.002 mg/kg dry weight (d.w.)</td>
<td>0.012</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ERC8d</td>
<td>Used ECETOC</td>
<td>Not applicable</td>
<td>Fresh water</td>
<td>0.009 mg/l</td>
<td>0.02</td>
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</tr>
</tbody>
</table>
### TRA model

<table>
<thead>
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<th>TRA model</th>
<th>Applicable</th>
<th>Fresh water sediment</th>
<th>Soil</th>
<th>Marine water</th>
<th>Marine sediment</th>
<th>ERC8f</th>
<th>Used ECETOC TRA model</th>
<th>Not Applicable</th>
<th>Fresh water</th>
<th>Soil</th>
<th>Marine water</th>
<th>Marine sediment</th>
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</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>0.03 mg/kg dry weight (d.w.)</td>
<td>0.004 mg/kg dry weight (d.w.)</td>
<td>0.0009 mg/l</td>
<td>0.00032 mg/kg dry weight (d.w.)</td>
<td>0.0053 mg/l</td>
<td>0.02 mg/kg dry weight (d.w.)</td>
<td>0.004 mg/kg dry weight (d.w.)</td>
<td>0.0005 mg/l</td>
<td>0.002 mg/kg dry weight (d.w.)</td>
<td>0.012</td>
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</tr>
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</table>

### Workers

<table>
<thead>
<tr>
<th>Contributing Scenario</th>
<th>Exposure Assessment Method</th>
<th>Specific conditions</th>
<th>Value type</th>
<th>Level of Exposure</th>
<th>RCR</th>
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<tbody>
<tr>
<td>PROC1</td>
<td>ECETOC TRA v2.0 Worker</td>
<td>Use in closed process, no likelihood of exposure</td>
<td>Chronic inhalation systemic exposure</td>
<td>0.031 mg/m³</td>
<td>0.01</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Chronic dermal systemic exposure</td>
<td>0.343 mg/kg bw/day</td>
<td>0.002</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Combined routes</td>
<td>0.347 mg/kg bw/day</td>
<td>0.004</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Chronic dermal local exposure</td>
<td>0.100 mg/cm²</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Acute inhalation systemic exposure</td>
<td>0.061 mg/m³</td>
<td>0.001</td>
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<td></td>
<td>Acute dermal systemic exposure</td>
<td>0.343 mg/kg bw/day</td>
<td>0.002</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Combined routes</td>
<td>0.343 mg/kg bw/day</td>
<td>0.004</td>
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<tr>
<td></td>
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<td>Acute dermal local exposure</td>
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<td>0.385</td>
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<tr>
<td>PROC2</td>
<td>ECETOC TRA v2.0 Worker</td>
<td>Use in closed, continuous process with occasional controlled exposure</td>
<td>Chronic inhalation systemic exposure</td>
<td>6.148 mg/m³</td>
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<td>Combined routes</td>
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<td>Chronic dermal local exposure</td>
<td>0.020 mg/cm2</td>
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<td>Acute inhalation systemic exposure</td>
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<td>Acute dermal systemic exposure</td>
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<td>Combined routes</td>
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<td>Acute dermal local exposure</td>
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<td>PROC8a ECETOC TRA v2.0 Worker</td>
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<td>Chronic dermal systemic exposure</td>
<td>1.371 mg/kg bw/day</td>
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<tr>
<td>Chronic dermal local exposure</td>
<td>0.100 mg/cm2</td>
<td>0.769</td>
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<td></td>
<td></td>
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<tr>
<td>Acute inhalation systemic exposure</td>
<td>30.739 mg/m³</td>
<td>0.498</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Acute dermal systemic exposure</td>
<td>1.371 mg/kg bw/day</td>
<td>0.021</td>
<td></td>
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<tr>
<td>Combined routes</td>
<td>1.509 mg/kg bw/day</td>
<td>0.519</td>
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<tr>
<td>Acute dermal local exposure</td>
<td>15.433 mg/cm2</td>
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<tr>
<td>PROC8b ECETOC TRA v2.0 Worker</td>
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<tr>
<td>Chronic dermal systemic exposure</td>
<td>0.686 mg/kg bw/day</td>
<td>0.010</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Combined routes</td>
<td>1.267 mg/kg bw/day</td>
<td>0.110</td>
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<tr>
<td>Chronic dermal local exposure</td>
<td>0.100 mg/cm2</td>
<td>0.769</td>
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<tr>
<td>Acute inhalation systemic exposure</td>
<td>6.148 mg/m³</td>
<td>0.100</td>
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<tr>
<td>Acute dermal systemic exposure</td>
<td>0.686 mg/kg bw/day</td>
<td>0.010</td>
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<tr>
<td>Combined routes</td>
<td>0.713 mg/kg</td>
<td>0.110</td>
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<tr>
<td>Source</td>
<td>Exposure Scenario</td>
<td>Method</td>
<td>Exposure Limit</td>
<td>Exposure Limit Value</td>
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<td>-------------------</td>
<td>--------</td>
<td>----------------</td>
<td>----------------------</td>
<td></td>
</tr>
<tr>
<td>PROC14 ECETOC TRA v2.0 Worker</td>
<td>Production of preparations or articles by tabletting, compression, extrusion, pelleting</td>
<td>Acute dermal local exposure</td>
<td>0.100 mg/cm²</td>
<td>0.769</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Chronic inhalation systemic exposure</td>
<td>6.173 mg/m³</td>
<td>0.199</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Chronic dermal systemic exposure</td>
<td>0.343 mg/kg bw/day</td>
<td>0.005</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Combined routes</td>
<td>1.225 mg/kg bw/day</td>
<td>0.204</td>
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</tr>
<tr>
<td></td>
<td></td>
<td>Chronic dermal local exposure</td>
<td>0.050 mg/cm²</td>
<td>0.385</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Acute inhalation systemic exposure</td>
<td>12.295 mg/m³</td>
<td>0.199</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Acute dermal systemic exposure</td>
<td>0.343 mg/kg bw/day</td>
<td>0.005</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Combined routes</td>
<td>0.399 mg/kg bw/day</td>
<td>0.204</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Acute dermal local exposure</td>
<td>0.050 mg/cm²</td>
<td>0.385</td>
<td></td>
</tr>
</tbody>
</table>

**4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario**

Environment - Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures. Further details on scaling and control technologies are provided in SpERC factsheet [http://cefic.org/en/reach-for-industries-libraries.html](http://cefic.org/en/reach-for-industries-libraries.html). No additional risk management measures required.

Health - Estimated workplace exposures are not expected to exceed DNELs when the identified risk management measures are adopted. Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.
SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers
   
   Product name : Diisopropyl ether
   
   Product Number : 38270
   Brand : Sigma-Aldrich
   Index-No. : 603-045-00-X
   REACH No. : A registration number is not available for this substance as the substance or its uses are exempted from registration, the annual tonnage does not require a registration or the registration is envisaged for a later registration deadline.
   CAS-No. : 108-20-3

1.2 Relevant identified uses of the substance or mixture and uses advised against
   
   Identified uses : Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet
   
   Company : Sigma-Aldrich Chemie GmbH
   Riedstrasse 2
   D-89555 STEINHEIM
   
   Telephone : +49 89-6513-1444
   Fax : +49 7329-97-2319
   E-mail address : eurtechserv@sial.com

1.4 Emergency telephone number
   
   Emergency Phone # : 0800 181 7059 (CHEMTREC Deutschland)
   +49 (0)696 43508409 (CHEMTREC weltweit)

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture
   
   Classification according to Regulation (EC) No 1272/2008
   Flammable liquids (Category 2), H225
   Specific target organ toxicity - single exposure (Category 3), Central nervous system, H336
   
   For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 Label elements
   
   Labelling according Regulation (EC) No 1272/2008
   Pictogram
   
   Signal word : Danger
   Hazard statement(s)
   H225 : Highly flammable liquid and vapour.
   H336 : May cause drowsiness or dizziness.
Precautionary statement(s)
P210  Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
P370 + P378 In case of fire: Use dry powder or dry sand to extinguish.
P403 + P235 Store in a well-ventilated place. Keep cool.

Supplemental Hazard information (EU)
EUH019  May form explosive peroxides.
EUH066  Repeated exposure may cause skin dryness or cracking.

2.3 Other hazards
This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.
May form explosive peroxides.

SECTION 3: Composition/information on ingredients

3.1 Substances
Synonyms : Isopropyl ether
Formula : C₆H₁₄O
Molecular weight : 102.17 g/mol
CAS-No. : 108-20-3
EC-No. : 203-560-6
Index-No. : 603-045-00-X

No components need to be disclosed according to the applicable regulations.
For the full text of the H-Statements mentioned in this Section, see Section 16.

SECTION 4: First aid measures

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.
5.2 Special hazards arising from the substance or mixture
No data available

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
Use water spray to cool unopened containers.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
Use personal protective equipment. Avoid breathing vapours, mist or gas. Ensure adequate ventilation.
Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapours accumulating to
form explosive concentrations. Vapours can accumulate in low areas.
For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

6.3 Methods and materials for containment and cleaning up
Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and
place in container for disposal according to local regulations (see section 13).

6.4 Reference to other sections
For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling
Avoid inhalation of vapour or mist.
Keep away from sources of ignition - No smoking. Take measures to prevent the build up of electrostatic
charge.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Store in cool place. Keep container tightly closed in a dry and well-ventilated place. Containers which are
opened must be carefully resealed and kept upright to prevent leakage.

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

SECTION 8: Exposure controls/personal protection

8.1 Control parameters
Components with workplace control parameters

8.2 Exposure controls
Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and
at the end of workday.

Personal protective equipment
Eye/face protection
Face shield and safety glasses Use equipment for eye protection tested and approved under
appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique
(without touching glove's outer surface) to avoid skin contact with this product. Dispose of
contaminated gloves after use in accordance with applicable laws and good laboratory practices.
Wash and dry hands.

The selected protective gloves have to satisfy the specifications of EU Directive 89/686/EEC and
the standard EN 374 derived from it.
Full contact
Material: butyl-rubber
Minimum layer thickness: 0.3 mm
Break through time: 480 min
Material tested: Butoject® (KCL 897 / Aldrich Z677647, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.2 mm
Break through time: 35 min
Material tested: Dermatril® P (KCL 743 / Aldrich Z677388, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de,
test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374,
contact the supplier of the CE approved gloves. This recommendation is advisory only and must
be evaluated by an industrial hygienist and safety officer familiar with the specific situation of
anticipated use by our customers. It should not be construed as offering an approval for any
specific use scenario.

Body Protection
Impervious clothing, Flame retardant antistatic protective clothing.. The type of protective
equipment must be selected according to the concentration and amount of the dangerous
substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator
with multi-purpose combination (US) or type AXBEK (EN 14387) respirator cartridges as a backup
to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air
respirator. Use respirators and components tested and approved under appropriate government
standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a) Appearance  Form: clear, liquid
    Colour: colourless
b) Odour  No data available
c) Odour Threshold  No data available
d) pH  No data available
e) Melting point/freezing point  Melting point/range: -85 °C - lit.
f) Initial boiling point and boiling range  68 - 69 °C - lit.
g) Flash point  -29 °C - closed cup
h) Evaporation rate  No data available
i) Flammability (solid, gas)  No data available
j) Upper/lower flammability or explosive limits
   Upper explosion limit: 21 %(V)
   Lower explosion limit: 1 %(V)

k) Vapour pressure
   227 hPa at 25 °C
   160 hPa at 20 °C
l) Vapour density
   3,53 - (Air = 1.0)
9.2 Other safety information
Relative vapour density 3.53 - (Air = 1.0)

SECTION 10: Stability and reactivity

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions. Contains the following stabiliser(s):
BHT (0.001 %)

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
Heat, flames and sparks.

10.5 Incompatible materials
Strong oxidizing agents

10.6 Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Carbon oxides
Other decomposition products - No data available
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - 8.470 mg/kg
LC50 Inhalation - Rat - 162.000 mg/m3
LD50 Dermal - Rabbit - 14.480 mg/kg

Skin corrosion/irritation
Skin - Rabbit
Result: Mild skin irritation

Serious eye damage/eye irritation
No data available

Respiratory or skin sensitisation
No data available
Germ cell mutagenicity
No data available

Carcinogenicity
IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

Reproductive toxicity
Reproductive toxicity - Rat - Inhalation
Maternal Effects: Other effects. Specific Developmental Abnormalities: Musculoskeletal system.

Specific target organ toxicity - single exposure
May cause drowsiness or dizziness.

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

Additional Information
RTECS: TZ5425000

Nausea, Headache, Vomiting, narcosis
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

SECTION 12: Ecological information

12.1 Toxicity

12.2 Persistence and degradability
Biodegradability aerobic - Exposure time 28 d
Result: 0 % - Not biodegradable
(OECD Test Guideline 301D)
Remarks: No data available

Ratio BOD/ThBOD 19 %

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

12.6 Other adverse effects

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product
Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Offer surplus and non-recyclable solutions to a licensed disposal company.

Contaminated packaging
Dispose of as unused product.

SECTION 14: Transport information

14.1 UN number
ADR/RID: 1159
IMDG: 1159
IATA: 1159

Sigma-Aldrich - 38270
14.2 UN proper shipping name
ADR/RID: DIISOPROPYL ETHER
IMDG: DIISOPROPYL ETHER
IATA: Diisopropyl ether

14.3 Transport hazard class(es)
ADR/RID: 3
IMDG: 3
IATA: 3

14.4 Packaging group
ADR/RID: II
IMDG: II
IATA: II

14.5 Environmental hazards
ADR/RID: no
IMDG Marine pollutant: no
IATA: no

14.6 Special precautions for user
No data available

SECTION 15: Regulatory information

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture
This safety datasheet complies with the requirements of Regulation (EC) No. 1907/2006.

15.2 Chemical safety assessment
For this product a chemical safety assessment was not carried out

SECTION 16: Other information

Full text of H-Statements referred to under sections 2 and 3.

EUH019 May form explosive peroxides.
EUH066 Repeated exposure may cause skin dryness or cracking.
H225 Highly flammable liquid and vapour.
H336 May cause drowsiness or dizziness.

Further information
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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.
SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers

Product name: Chlorine

Product Number: 295132
Brand: Aldrich
Index-No.: 017-001-00-7
REACH No.: A registration number is not available for this substance as the substance or its uses are exempted from registration, the annual tonnage does not require a registration or the registration is envisaged for a later registration deadline.

CAS-No.: 7782-50-5

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses: Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet

Company: Sigma-Aldrich Chemie GmbH
Riedstrasse 2
D-89555 STEINHEIM

Telephone: +49 89-6513-1444
Fax: +49 7329-97-2319
E-mail address: eurtechserv@sial.com

1.4 Emergency telephone number

Emergency Phone # 0800 181 7059 (CHEMTREC Deutschland)
+49 (0)696 43508409 (CHEMTREC weltweit)

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

Classification according to Regulation (EC) No 1272/2008
Oxidizing gases (Category 1), H270
Gases under pressure (Compressed gas), H280
Acute toxicity, Inhalation (Category 3), H331
Skin irritation (Category 2), H315
Eye irritation (Category 2), H319
Specific target organ toxicity - single exposure (Category 3), Respiratory system, H335
Acute aquatic toxicity (Category 1), H400

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 Label elements

Labelling according Regulation (EC) No 1272/2008
Pictogram
Signal word: Danger

**Hazard statement(s)**
- H270: May cause or intensify fire; oxidizer.
- H280: Contains gas under pressure; may explode if heated.
- H315: Causes skin irritation.
- H319: Causes serious eye irritation.
- H331: Toxic if inhaled.
- H335: May cause respiratory irritation.
- H400: Very toxic to aquatic life.

**Precautionary statement(s)**
- P220: Keep/Store away from clothing/ combustible materials.
- P244: Keep valves and fittings free from oil and grease.
- P261: Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray.
- P304 + P340 + P311: IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER/doctor.
- P403 + P233: Store in a well-ventilated place. Keep container tightly closed.
- P410 + P403: Protect from sunlight. Store in a well-ventilated place.

Supplemental Hazard Statements: None

**2.3 Other hazards**
This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

---

**SECTION 3: Composition/information on ingredients**

**3.1 Substances**

<table>
<thead>
<tr>
<th>Formula</th>
<th>Molecular weight</th>
<th>CAS-No.</th>
<th>EC-No.</th>
<th>Index-No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cl₂</td>
<td>70.91 g/mol</td>
<td>7782-50-5</td>
<td>231-959-5</td>
<td>017-001-00-7</td>
</tr>
</tbody>
</table>

**Hazardous ingredients according to Regulation (EC) No 1272/2008**

<table>
<thead>
<tr>
<th>Component</th>
<th>Classification</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cl₂</td>
<td>Ox. Gas 1; Press. Gas Compr. Gas; Acute Tox. 3; Skin Irrit. 2; Eye Irrit. 2; STOT SE 3; Aquatic Acute 1; H270, H280, H331, H315, H319, H335, H400</td>
<td>&lt;= 100 %</td>
</tr>
</tbody>
</table>

M-Factor - Aquatic Acute: 100

For the full text of the H-Statements mentioned in this Section, see Section 16.

---

**SECTION 4: First aid measures**

**4.1 Description of first aid measures**

**General advice**
Consult a physician. Show this safety data sheet to the doctor in attendance.

**If inhaled**
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

**In case of skin contact**
Wash off with soap and plenty of water. Take victim immediately to hospital. Consult a physician.
In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

SECTION 5: Firefighting measures

5.1 Extinguishing media
Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
No data available

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
Use water spray to cool unopened containers.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
Wear respiratory protection. Avoid breathing vapours, mist or gas. Ensure adequate ventilation.
Evacuate personnel to safe areas.
For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up
Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations (see section 13).

6.4 Reference to other sections
For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.
Keep away from sources of ignition - No smoking.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Store in cool place. Keep container tightly closed in a dry and well-ventilated place.
Contents under pressure.
Storage class (TRGS 510): Gases

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated
SECTION 8: Exposure controls/personal protection

8.1 Control parameters
   Components with workplace control parameters

8.2 Exposure controls
   Appropriate engineering controls
   Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product.

Personal protective equipment

   Eye/face protection
   Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

   Skin protection
   Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove’s outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

   The selected protective gloves have to satisfy the specifications of EU Directive 89/686/EEC and the standard EN 374 derived from it.

   Full contact
   Material: Fluorinated rubber
   Minimum layer thickness: 0,7 mm
   Break through time: 480 min
   Material tested: Vitrobot® (KCL 890 / Aldrich Z677698, Size M)

   Splash contact
   Material: Fluorinated rubber
   Minimum layer thickness: 0,7 mm
   Break through time: 480 min
   Material tested: Vitrobot® (KCL 890 / Aldrich Z677698, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
   If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

   Body Protection
   Complete suit protecting against chemicals. The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

   Respiratory protection
   Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type AXBEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

   Control of environmental exposure
   Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.
SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a) Appearance Form: Compressed gas
   Colour: yellow
b) Odour pungent
c) Odour Threshold No data available
d) pH 1.8 at 6.4 g/l at 20 °C
e) Melting point/freezing point Melting point/range: -101 °C - lit.
f) Initial boiling point and boiling range -34 °C - lit.
g) Flash point Not applicable
h) Evaporation rate No data available
i) Flammability (solid, gas) No data available
j) Upper/lower flammability or explosive limits No data available
k) Vapour pressure 6.399 hPa at 20 °C
l) Vapour density 2.44 - (Air = 1.0)
m) Relative density 1.563 g/cm3 at -33.99 °C
n) Water solubility ca. 10 g/l at 20 °C
o) Partition coefficient: n-octanol/water No data available
p) Auto-ignition temperature No data available
q) Decomposition temperature No data available
r) Viscosity No data available
s) Explosive properties No data available
t) Oxidizing properties The substance or mixture is classified as oxidizing with the category 1.

9.2 Other safety information

Relative vapour density 2.44 - (Air = 1.0)

SECTION 10: Stability and reactivity

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
No data available

10.5 Incompatible materials
Alcohols
10.6 **Hazardous decomposition products**
Hazardous decomposition products formed under fire conditions. - Nature of decomposition products not known.
Other decomposition products - No data available
In the event of fire: see section 5

**SECTION 11: Toxicological information**

11.1 **Information on toxicological effects**

**Acute toxicity**
LC50 Inhalation - Rat - 1 h - 293 ppm

**Skin corrosion/irritation**
No data available

**Serious eye damage/eye irritation**
No data available

**Respiratory or skin sensitisation**
No data available

**Germ cell mutagenicity**
Human
lymphocyte
Cytogenetic analysis

Mouse
sperm

**Carcinogenicity**
Carcinogenicity - Rat - Oral
Tumorigenic: Equivocal tumorigenic agent by RTECS criteria. Leukaemia
Carcinogenicity - Monkey - Inhalation
Tumorigenic: Neoplastic by RTECS criteria. Lungs, Thorax, or Respiration: Tumors.
This product is or contains a component that is not classifiable as to its carcinogenicity based on its IARC, ACGIH, NTP, or EPA classification.
IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

**Reproductive toxicity**
Reproductive toxicity - Rat - Oral
Effects on Newborn: Biochemical and metabolic.

**Specific target organ toxicity - single exposure**
May cause respiratory irritation.

**Specific target organ toxicity - repeated exposure**
No data available

**Aspiration hazard**
No data available

**Additional Information**
RTECS: FO2100000
Material is extremely destructive to tissue of the mucous membranes and upper respiratory tract, eyes, and skin., Cough, Shortness of breath, Headache, Nausea

**SECTION 12: Ecological information**

12.1 **Toxicity**
12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

12.6 Other adverse effects
Very toxic to aquatic life.

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product
Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Offer surplus and non-recyclable solutions to a licensed disposal company.

Contaminated packaging
Dispose of as unused product.

SECTION 14: Transport information

14.1 UN number
ADR/RID: 1017
IMDG: 1017
IATA: 1017

14.2 UN proper shipping name
ADR/RID: CHLORINE
IMDG: CHLORINE
IATA: Chlorine

Passenger Aircraft: Not permitted for transport
Cargo Aircraft: Not permitted for transport

14.3 Transport hazard class(es)
ADR/RID: 2.3 (5.1, 8)
IMDG: 2.3 (5.1, 8)
IATA: 2.3 (5.1, 8)

14.4 Packaging group
ADR/RID: -
IMDG: -
IATA: -

14.5 Environmental hazards
ADR/RID: yes
IMDG Marine pollutant: yes
IATA: no

14.6 Special precautions for user
No data available

SECTION 15: Regulatory information

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture
This safety datasheet complies with the requirements of Regulation (EC) No. 1907/2006.

15.2 Chemical safety assessment
For this product a chemical safety assessment was not carried out
SECTION 16: Other information

Full text of H-Statements referred to under sections 2 and 3.

H270  May cause or intensify fire; oxidizer.
H280  Contains gas under pressure; may explode if heated.
H315  Causes skin irritation.
H319  Causes serious eye irritation.
H331  Toxic if inhaled.
H335  May cause respiratory irritation.
H400  Very toxic to aquatic life.

Further information
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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.
SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers

Product name: Ethanolamine

Product Number: 411000
Brand: Aldrich
Index-No.: 603-030-00-8
REACH No.: A registration number is not available for this substance as the substance or its uses are exempted from registration, the annual tonnage does not require a registration or the registration is envisaged for a later registration deadline.

CAS-No.: 141-43-5

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses: Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet

Company: Sigma-Aldrich Chemie GmbH
Riedstrasse 2
D-89555 STEINHEIM

Telephone: +49 89-6513-1444
Fax: +49 7329-97-2319
E-mail address: eurtechserv@sial.com

1.4 Emergency telephone number

Emergency Phone #
0800 181 7059 (CHEMTREC Deutschland)
+49 (0)696 43508409 (CHEMTREC weltweit)

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

Classification according to Regulation (EC) No 1272/2008
- Acute toxicity, Oral (Category 4), H302
- Acute toxicity, Inhalation (Category 4), H332
- Acute toxicity, Dermal (Category 4), H312
- Skin corrosion (Category 1B), H314
- Chronic aquatic toxicity (Category 3), H412
- Specific target organ toxicity - single exposure (Category 3), Respiratory system, H335

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 Label elements

Labelling according Regulation (EC) No 1272/2008
Pictogram

Signal word: Danger
Hazard statement(s)
H302 + H312 + H332  Harmful if swallowed, in contact with skin or if inhaled
H314  Causes severe skin burns and eye damage.
H335  May cause respiratory irritation.
H412  Harmful to aquatic life with long lasting effects.

Precautionary statement(s)
P261  Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray.
P273  Avoid release to the environment.
P301 + P312 + P330  IF SWALLOWED: Call a POISON CENTER or doctor/ physician if you feel unwell. Rinse mouth.
P303 + P361 + P353  IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.
P304 + P340 + P310  IF INHALED: Remove person to fresh air and keep comfortable for breathing. Immediately call a POISON CENTER or doctor/ physician.
P305 + P351 + P338  IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

Supplemental Hazard Statements
none

2.3 Other hazards
This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

SECTION 3: Composition/information on ingredients

3.1 Substances
Syonyms : Monoethanolamine
2-Aminoethyl alcohol
2-Aminoethanol

Formula : C₂H₇NO
Molecular weight : 61.08 g/mol
CAS-No. : 141-43-5
EC-No. : 205-483-3
Index-No. : 603-030-00-8

Hazardous ingredients according to Regulation (EC) No 1272/2008

<table>
<thead>
<tr>
<th>Component</th>
<th>Classification</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethanolamine</td>
<td>Acute Tox. 4; Skin Corr. 1B; STOT SE 3; Aquatic Chronic 3; H302, H332, H312, H314, H335, H412</td>
<td>&lt;= 100 %</td>
</tr>
</tbody>
</table>

For the full text of the H-Statements mentioned in this Section, see Section 16.

SECTION 4: First aid measures

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.
**In case of skin contact**
Take off contaminated clothing and shoes immediately. Wash off with soap and plenty of water. Consult a physician.

**In case of eye contact**
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

**If swallowed**
Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 **Most important symptoms and effects, both acute and delayed**
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11.

4.3 **Indication of any immediate medical attention and special treatment needed**
No data available

**SECTION 5: Firefighting measures**

5.1 **Extinguishing media**

**Suitable extinguishing media**
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 **Special hazards arising from the substance or mixture**
Carbon oxides, Nitrogen oxides (NOx)

5.3 **Advice for firefighters**
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 **Further information**
Use water spray to cool unopened containers.

**SECTION 6: Accidental release measures**

6.1 **Personal precautions, protective equipment and emergency procedures**
Use personal protective equipment. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapours accumulating to form explosive concentrations. Vapours can accumulate in low areas. For personal protection see section 8.

6.2 **Environmental precautions**
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 **Methods and materials for containment and cleaning up**
Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations (see section 13). Keep in suitable, closed containers for disposal.

6.4 **Reference to other sections**
For disposal see section 13.

**SECTION 7: Handling and storage**

7.1 **Precautions for safe handling**
Avoid contact with skin and eyes. Avoid inhalation of vapour or mist. Keep away from sources of ignition - No smoking. Take measures to prevent the build up of electrostatic charge. For precautions see section 2.2.

7.2 **Conditions for safe storage, including any incompatibilities**
Store in cool place. Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.

Hygroscopic. Handle and store under inert gas.
Storage class (TRGS 510): Combustible, corrosive hazardous materials

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

SECTION 8: Exposure controls/personal protection

8.1 Control parameters
Components with workplace control parameters

8.2 Exposure controls
Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection
Tightly fitting safety goggles. Faceshield (8-inch minimum). Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

The selected protective gloves have to satisfy the specifications of EU Directive 89/686/EEC and the standard EN 374 derived from it.

Full contact
Material: Nature latex/chloroprene
Minimum layer thickness: 0,6 mm
Break through time: 480 min
Material tested:Lapren® (KCL 706 / Aldrich Z677558, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0,2 mm
Break through time: 30 min
Material tested:Dermatril® P (KCL 743 / Aldrich Z677388, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de,
test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.
SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a) Appearance
   Form: liquid, clear
   Colour: colourless

b) Odour
   amine-like

c) Odour Threshold
   No data available

d) pH
   12.1 at 100 g/l at 20 °C

e) Melting point/freezing point
   Melting point/range: 10 - 11 °C - lit.

f) Initial boiling point and boiling range
   170 °C - lit.
   69 - 70 °C at 13 hPa

g) Flash point
   91 °C - closed cup

h) Evaporation rate
   No data available

i) Flammability (solid, gas)
   No data available

j) Upper/lower flammability or explosive limits
   Upper explosion limit: 17 %(V)
   Lower explosion limit: 2.5 %(V)

k) Vapour pressure
   0.3 hPa at 20 °C

l) Vapour density
   2.11 - (Air = 1.0)

m) Relative density
   1.012 g/mL at 25 °C

n) Water solubility
   1.000 g/l at 20 °C - completely miscible

o) Partition coefficient: n-octanol/water
   log Pow: -2.299 at 25 °C

p) Auto-ignition temperature
   424 °C

q) Decomposition temperature
   No data available

r) Viscosity
   No data available

s) Explosive properties
   No data available

t) Oxidizing properties
   No data available

9.2 Other safety information

Relative vapour density 2.11 - (Air = 1.0)

SECTION 10: Stability and reactivity

10.1 Reactivity
   No data available

10.2 Chemical stability
   Absorbs carbon dioxide (CO2) from air.
   Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
   No data available

10.4 Conditions to avoid
   Exposure to moisture
   Heat, flames and sparks.
10.5 Incompatible materials
Strong acids and oxidizing agents, Iron, Copper, Brass, Rubber

10.6 Hazardous decomposition products
Other decomposition products - No data available
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - male and female - 1.089 mg/kg
(OECD Test Guideline 401)
Inhalation: Material is extremely destructive to the tissue of the mucous membranes and upper respiratory tract.
LD50 Dermal - Rabbit - 1.015 mg/kg

Skin corrosion/irritation
Skin - Rabbit
Result: Causes burns.
(OECD Test Guideline 404)

Serious eye damage/eye irritation
Eyes - Rabbit
Result: Corrosive
(OECD Test Guideline 405)

Respiratory or skin sensitisation
No data available

Germ cell mutagenicity
Ames test
Salmonella typhimurium
Result: negative
(OECD Test Guideline 474)
Mouse - male and female
Result: negative

Carcinogenicity
IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

Reproductive toxicity
No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

Additional Information
RTECS: KJ5775000
burning sensation, Cough, wheezing, laryngitis, Shortness of breath, spasm, inflammation and edema of the larynx, spasm, inflammation and edema of the bronchi, pneumonitis, pulmonary edema, Material is extremely destructive to tissue of the mucous membranes and upper respiratory tract, eyes, and skin.
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.
Liver - Irregularities - Based on Human Evidence
SECTION 12: Ecological information

12.1 Toxicity
Toxicity to fish  
semi-static test LC50 - Cyprinus carpio (Carp) - 150 mg/l - 96 h
Toxicity to daphnia and other aquatic invertebrates  
EC50 - Daphnia magna (Water flea) - 65 mg/l - 48 h
Toxicity to algae  
static test EC50 - Selenastrum capricornutum (green algae) - 2,8 mg/l - 72 h  
(OECD Test Guideline 201)
Toxicity to bacteria  
EC50 - Pseudomonas putida - 110 mg/l - 17 h  
(DIN 38 412 Part 8)

12.2 Persistence and degradability
Biodegradability  
aerobic - Exposure time 28 d
Result: > 70 % - Readily biodegradable  
(OECD Test Guideline 301F)

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

12.6 Other adverse effects
Toxic to aquatic life.

SECTION 13: Disposal considerations

13.1 Waste treatment methods
Product
This combustible material may be burned in a chemical incinerator equipped with an afterburner and scrubber. Offer surplus and non-recyclable solutions to a licensed disposal company.

Contaminated packaging
Dispose of as unused product.

SECTION 14: Transport information

14.1 UN number
ADR/RID: 2491  
IMDG: 2491  
IATA: 2491

14.2 UN proper shipping name
ADR/RID: ETHANOLAMINE
IMDG: ETHANOLAMINE
IATA: Ethanolamine

14.3 Transport hazard class(es)
ADR/RID: 8  
IMDG: 8  
IATA: 8

14.4 Packaging group
ADR/RID: III  
IMDG: III  
IATA: III

14.5 Environmental hazards
ADR/RID: no  
IMDG Marine pollutant: no  
IATA: no

14.6 Special precautions for user
No data available
SECTION 15: Regulatory information
This safety datasheet complies with the requirements of Regulation (EC) No. 453/2010.

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture

15.2 Chemical Safety Assessment
For this product a chemical safety assessment was not carried out

SECTION 16: Other information
Full text of H-Statements referred to under sections 2 and 3.

| H302       | Harmful if swallowed.                      |
| H302 + H312 + | Harmful if swallowed, in contact with skin or if inhaled |
| H332       |                                             |
| H312       | Harmful in contact with skin.              |
| H314       | Causes severe skin burns and eye damage.   |
| H335       | May cause respiratory irritation.          |
| H412       | Harmful to aquatic life with long lasting effects. |

Further information
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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.
SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers

Product name : Bentonite

Product Number : 285234
Brand : Sigma-Aldrich
REACH No. : A registration number is not available for this substance as the substance or its uses are exempted from registration, the annual tonnage does not require a registration or the registration is envisaged for a later registration deadline.
CAS-No. : 1302-78-9

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Chemie GmbH
Riedstrasse 2
D-89555 STEINHEIM

Telephone : +49 89-6513-1444
Fax : +49 7329-97-2319
E-mail address : eurtechserv@sial.com

1.4 Emergency telephone number

Emergency Phone # : 0800 181 7059 (CHEMTREC Deutschland)
+49 (0)696 43508409 (CHEMTREC weltweit)

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

Not a hazardous substance or mixture according to Regulation (EC) No. 1272/2008.

2.2 Label elements

Not a hazardous substance or mixture.

2.3 Other hazards

This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

SECTION 3: Composition/information on ingredients

3.1 Substances

Synonyms : Montmorillonite
Molecular weight : 180.1 g/mol
CAS-No. : 1302-78-9
SECTION 4: First aid measures

4.1 Description of first aid measures

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration.

In case of skin contact
Wash off with soap and plenty of water.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
No data available

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
No data available

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
Avoid dust formation. Avoid breathing vapours, mist or gas.
For personal protection see section 8.

6.2 Environmental precautions
No special environmental precautions required.

6.3 Methods and materials for containment and cleaning up
Sweep up and shovel. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling
Provide appropriate exhaust ventilation at places where dust is formed.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Store in cool place. Keep container tightly closed in a dry and well-ventilated place.
7.3 **Specific end use(s)**
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Components with workplace control parameters

8.2 Exposure controls

Appropriate engineering controls
General industrial hygiene practice.

**Personal protective equipment**

**Eye/face protection**
Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

**Skin protection**
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove’s outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

The selected protective gloves have to satisfy the specifications of EU Directive 89/686/EEC and the standard EN 374 derived from it.

**Full contact**
Material: Nitrile rubber
Minimum layer thickness: 0,11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

**Splash contact**
Material: Nitrile rubber
Minimum layer thickness: 0,11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

**Body Protection**
Choose body protection in relation to its type, to the concentration and amount of dangerous substances, and to the specific work-place., The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

**Respiratory protection**
Respiratory protection is not required. Where protection from nuisance levels of dusts are desired, use type N95 (US) or type P1 (EN 143) dust masks. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

**Control of environmental exposure**
No special environmental precautions required.

SECTION 9: Physical and chemical properties

9.1 **Information on basic physical and chemical properties**

a) **Appearance**
Form: granules
b) Odour | No data available
---|---
c) Odour Threshold | No data available
d) pH | 6.0 - 9.0
e) Melting point/freezing point | No data available
f) Initial boiling point and boiling range | No data available
g) Flash point | Not applicable
h) Evaporation rate | No data available
i) Flammability (solid, gas) | No data available
j) Upper/lower flammability or explosive limits | No data available
k) Vapour pressure | No data available
l) Vapour density | No data available
m) Relative density | 2,400 g/cm³
n) Water solubility | No data available
o) Partition coefficient: n-octanol/water | No data available
p) Auto-ignition temperature | No data available
q) Decomposition temperature | No data available
r) Viscosity | No data available
s) Explosive properties | No data available
t) Oxidizing properties | No data available

9.2 Other safety information
No data available

SECTION 10: Stability and reactivity

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
No data available

10.5 Incompatible materials
Strong acids

10.6 Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Aluminum oxide, silicon oxides
Other decomposition products - No data available
In the event of fire: see section 5
SECTION 11: Toxicological information

11.1 Information on toxicological effects

**Acute toxicity**
LD50 Intravenous - Rat - 35 mg/kg
Remarks: Lungs, Thorax, or Respiration: Acute pulmonary edema.

**Skin corrosion/irritation**
No data available

**Serious eye damage/eye irritation**
No data available

**Respiratory or skin sensitisation**
No data available

**Germ cell mutagenicity**
No data available

**Carcinogenicity**
Carcinogenicity - Mouse - Oral
Tumorigenic: Equivocal tumorigenic agent by RTECS criteria. Liver: Tumors.
IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable or confirmed human carcinogen by IARC.

**Reproductive toxicity**
No data available

**Specific target organ toxicity - single exposure**
No data available

**Specific target organ toxicity - repeated exposure**
No data available

**Aspiration hazard**
No data available

**Additional Information**
RTECS: CT9450000
Lung irritation, Asthma

SECTION 12: Ecological information

12.1 Toxicity
Toxicity to fish LC50 - Oncorhynchus mykiss (rainbow trout) - 19.000 mg/l - 96 h

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

12.6 Other adverse effects
No data available
SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product
Offer surplus and non-recyclable solutions to a licensed disposal company.

Contaminated packaging
Dispose of as unused product.

SECTION 14: Transport information

14.1 UN number

ADR/RID: -  
IMDG: -  
IATA: -

14.2 UN proper shipping name

ADR/RID: Not dangerous goods  
IMDG: Not dangerous goods  
IATA: Not dangerous goods

14.3 Transport hazard class(es)

ADR/RID: -  
IMDG: -  
IATA: -

14.4 Packaging group

ADR/RID: -  
IMDG: -  
IATA: -

14.5 Environmental hazards

ADR/RID: no  
IMDG Marine pollutant: no  
IATA: no

14.6 Special precautions for user

No data available

SECTION 15: Regulatory information

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture

This safety datasheet complies with the requirements of Regulation (EC) No. 1907/2006.

15.2 Chemical safety assessment

For this product a chemical safety assessment was not carried out

SECTION 16: Other information

Further information
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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.
“Chemical risks assessment mission preliminary results”

Presentation delivered on September 22, 2017 to the Ministry of Emergency Situation
UN Chemical Risks Assessment Mission to Armenia
Nairit Plant – Yerevan
11 – 23 September 2017
UN Chemical Risks Assessment Mission to Armenia
Nairit Plant – Yerevan
UN Chemical Risks Assessment Mission to Armenia
Nairit Plant – Yerevan
UN Chemical Risks Assessment Mission to Armenia
Nairit Plant – Yerevan

Chemicals are not always clearly located and identified
# UN Chemical Risks Assessment Mission to Armenia

## Nairit Plant – Yerevan

<table>
<thead>
<tr>
<th>N°</th>
<th>CAS number</th>
<th>Chemical name</th>
<th>Level of purity</th>
<th>State (S, L, G)</th>
<th>Storage location(s)</th>
<th>Container size</th>
<th>Total Weight</th>
<th>Container conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>85-44-9</td>
<td>Phthalic anhydride</td>
<td>S</td>
<td>S</td>
<td>29L0-1</td>
<td>Barrel</td>
<td>127</td>
<td>Open</td>
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<tr>
<td>7</td>
<td>Anisole</td>
<td>100</td>
<td>S</td>
<td>S</td>
<td>29L0-2</td>
<td>25 kg bags</td>
<td>900</td>
<td>Good</td>
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<tr>
<td>16</td>
<td>Hexachloriphthalic</td>
<td>100</td>
<td>S</td>
<td>S</td>
<td>29L0-4</td>
<td>25 kg bags</td>
<td>200</td>
<td>Good</td>
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<td>23</td>
<td>Diethanolamine</td>
<td>111-42-2</td>
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<td>L</td>
<td>29L0-7</td>
<td>200 L Barrel</td>
<td>1100</td>
<td>Medium</td>
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<td>24</td>
<td>Diisobutylene</td>
<td>25167-70-8</td>
<td>L</td>
<td>L</td>
<td>29L0-8</td>
<td>200 L Barrel</td>
<td>50</td>
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<td>28</td>
<td>Di-n-butylhydroquinone</td>
<td>88-58-4</td>
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<td>S</td>
<td>29L0-8</td>
<td>200 L Barrel</td>
<td>2800</td>
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<tr>
<td>33</td>
<td>Resin</td>
<td>61700-51-0</td>
<td>S</td>
<td>S</td>
<td>29L0-5</td>
<td>20 kg bags</td>
<td>850</td>
<td>Medium</td>
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<td>Resin</td>
<td>97-90-5</td>
<td>L</td>
<td>L</td>
<td>29L0-8</td>
<td>200 L Barrel</td>
<td>1410</td>
<td>Bad</td>
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<td>54</td>
<td>Resin</td>
<td>149-30-4</td>
<td>S</td>
<td>S</td>
<td>29L0-1</td>
<td>200 L Barrel</td>
<td>390</td>
<td>Open, NH</td>
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<tr>
<td>55</td>
<td>Caprolactam</td>
<td>75-20-7</td>
<td>S</td>
<td>S</td>
<td>29L0-7</td>
<td>25 kg bags</td>
<td>8200</td>
<td>Medium</td>
</tr>
<tr>
<td>61</td>
<td>Coagulant A</td>
<td>100</td>
<td>S</td>
<td>S</td>
<td>29L0-2</td>
<td>10 kg bags</td>
<td>2000</td>
<td>Good</td>
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<tr>
<td>62</td>
<td>Coagulant MH-473 LRK</td>
<td>100</td>
<td>S</td>
<td>S</td>
<td>29L0-2</td>
<td>10 kg bags</td>
<td>2400</td>
<td>Good</td>
</tr>
<tr>
<td>77</td>
<td>Sodium nitrate, NaN03</td>
<td>7631-68-4</td>
<td>100</td>
<td>S</td>
<td>29L0-2</td>
<td>25 kg bags</td>
<td>2200</td>
<td>Medium</td>
</tr>
</tbody>
</table>
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Actions to undertake

1. Labelling
   ![Labelling Icon]

2. Repacking
   ![Repacking Icon]

3. Temporary storage
   ![Temporary Storage Icon]

4. Chemicals Waste Management
   ![Chemicals Waste Management Icon]
The report will give all the indications, using a light version of CLP:

<table>
<thead>
<tr>
<th>Code</th>
<th>CHEMICAL</th>
<th>CAS</th>
<th>Diisobutylene</th>
</tr>
</thead>
<tbody>
<tr>
<td>24</td>
<td>2600104200</td>
<td>25167-70-3</td>
<td></td>
</tr>
</tbody>
</table>

- Average cost: 5 000 $ / 2,5 millions of Drams to edit plastified labels
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2. REPACKING
When package is damaged, using adapted package safe to handle

- The report will propose procedures and indications: PPE, Package compatibility with waste ...

- Average cost: 0,5-1 millions $ / 250-500 millions
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3. Temporary storage
Using an existing building, easy to secure and prepare for storage

- **Specifications**:
  - Surface: average 4000 m²
  - Few windows, large door for handing
  - Natural ventilation
  - 200 m from the property limit.

- **Organisation**:
  - Storage by category and compatibilities (Acid – Caustic – Oxydant – etc.)
  - On one level only
  - Liquids on retention pools, with adapted absorbent
  - Dry sand and extinguisher

- **Average cost**: 100 000 $ / 50 millions Drams
The most adapted building is, in a first approximation the P3 (Main map nomenclature)
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4. Waste management
Analyse to determine the best way of elimination

Identification → Treatment → Final

Laboratory → Cement Factory
Laboratory → Incinerators
Laboratory → Treatments / Reconditioning
Laboratory → Recycling

Dump site

To be considered as a priority: Ammonia
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4. Waste management
Identification of the best way for elimination

- **Needs:**
  - Identify companies which can reuse / recycle chemicals
  - Identify cement factory willing to use chemicals as fuel
  - Organize transport in safe conditions
  - Identify and prepare a dump site integrate in a wider context

- **Average cost for elimination:** 5 to 10 millions $ / 2500 to 5000 millions Drams
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How to continue

- Tests to understand how to remove safely the “Lack Etinol” polymerized in tanks?
- Map the cement fiber containing asbestos elements / recover and properly dump the material
- Map the electrical transformers potentially containing PCB oil
- Map underground sewage and pipes network to prevent pollution and fire/explosion
- Work on identification of proper solutions to eliminate the hazards (for instance incineration)
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Thank you for your attention