1. PRODUCT AND COMPANY IDENTIFICATION

Product name: Dimethyl sulfoxide
Product Number: 472301
Brand: Sigma-Aldrich
Supplier: Sigma-Aldrich Corporation

2. HAZARDS IDENTIFICATION

Emergency Overview
OSHA Hazards: Combustible Liquid, Target Organ Effect
Target Organs: Eyes, Skin
GHS Classification: Flammable liquids (Category 4)
GHS Label elements, including precautionary statements
Picture: none
Signal word: Warning
Hazard statement(s): Health hazard: 0
HE27: Combustible liquid
Precautionary statement(s): none

HMIS Classification: Health hazard: 0
Chronic Health Hazard: 0
Flammability: 2
Physical hazards: 0

NFPA Rating: Health hazard: 0
Fire: 2
Reactivity Hazard: 0

Potential Health Effects
Inhalation: May cause eye irritation. May cause respiratory tract irritation.
Skin: May cause eye irritation. May cause skin irritation.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Synonyms: DMSO, Methyl sulfoxide
Formula: C₇H₈O₇
Molecular Weight: 78.13 g/mol

Component: Dimethyl sulfoxide
CAS No.: 67-68-5
EC-No.: 200-684-3
Concentration: <= 100%

4. FIRST AID MEASURES

General advice: Consult a physician. Show this safety data sheet to the doctor in attendance. Move out of dangerous area.

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.

5. FIREFIGHTING MEASURES

Conditions of flammability: Flammable. In the presence of a source of ignition when the temperature is above the flash point. Keep away from heat sources/open flame/hot surface. No smoking.
Suitable extinguishing media: Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.
Special protective equipment for firefighters: Wear self-contained breathing apparatus for fire fighting if necessary.
Hazardous combustion products: Hazardous decomposition products formed under fire conditions. - Carbon oxides, Sulphur oxides
Further Information: Use water spray to cool unopened containers.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions: Avoid inhalation. Vapours from this substance may be harmful. Avoid breathing vapours. Mist or gas. Remove all sources of ignition. Beware of vapours accumulating to form explosive concentrations. Vapours can accumulate in low areas.
Environmental precautions: Prevent further leakage or spillage if safe to do so. Do not let product enter drains.
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.

7. HANDLING AND STORAGE
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.

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

8. EXPOSURE CONTROLS/PERSONAL PROTECTION
Components with workplace control parameters

<table>
<thead>
<tr>
<th>Components</th>
<th>CAS-No.</th>
<th>Value</th>
<th>Control parameters</th>
<th>Basis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimethyl sulfoxide</td>
<td>67-68-5</td>
<td>IWA</td>
<td>250 ppm</td>
<td>USA, Workplace Environmental Exposure Levels (WEEL)</td>
</tr>
</tbody>
</table>

Personal protective equipment
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).

Hand 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.

Splash contact
Material: Nitric rubber
Minimum layer thickness: 0.2 mm
Break through time: 38 min
Material tested: Dermal Test P (KCL 743 / Aldrich 267758, Size M)

Data source: KCL GmbH, D-50124 Eichenau, phone: +49 (0) 6659 67300, 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.

Eye 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 and 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.

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

9. PHYSICAL AND CHEMICAL PROPERTIES
Appearance
Form liquid, clear

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Colour</td>
<td>Colourless</td>
</tr>
<tr>
<td>Safety data</td>
<td></td>
</tr>
<tr>
<td>pH</td>
<td>No data available</td>
</tr>
<tr>
<td>Melting point/freezing point</td>
<td>Melting point range: 16 - 19 °C (61 - 66 °F)</td>
</tr>
<tr>
<td>Boiling point</td>
<td>189 °C (372 °F)</td>
</tr>
<tr>
<td>Flash point</td>
<td>87 °C (189 °F) - closed cup</td>
</tr>
<tr>
<td>Ignition temperature</td>
<td>301 °C (574 °F)</td>
</tr>
<tr>
<td>Auto-ignition temperature</td>
<td>No data available</td>
</tr>
<tr>
<td>Lower explosion limit</td>
<td>3.5 % (V)</td>
</tr>
<tr>
<td>Upper explosion limit</td>
<td>42 % (V)</td>
</tr>
<tr>
<td>Vapour pressure</td>
<td>0.55 kPa (0.41 mmHg) at 20 °C (68 °F)</td>
</tr>
<tr>
<td>Density</td>
<td>1.1 g/mL</td>
</tr>
<tr>
<td>Water solubility</td>
<td>Completely miscible</td>
</tr>
<tr>
<td>Partition coefficient</td>
<td>n-octanol/water lg Pow.: -2.03</td>
</tr>
<tr>
<td>Relative vapour density</td>
<td>(Air = 1.0)</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>Evaporation rate</td>
<td>No data available</td>
</tr>
</tbody>
</table>

10. STABILITY AND REACTIVITY
Chemical stability
Stable under recommended storage conditions.

Possibility of hazardous reactions
No data available

Conditions to avoid
Heat, flames and sparks.

Materials to avoid
Acid chlorides, Phosphorus halides, Strong acids, Strong oxidizing agents, Strong reducing agents

Hazardous decomposition products
Hazardous decomposition products formed under fire conditions: Carbon oxides, Sulphur oxides

Other decomposition products: No data available

11. TOXICOLOGICAL INFORMATION
Acute toxicity
Oral LD50
LD50 Oral - rat - 14,500 mg/kg
Inhalation LC50
LC50 Inhalation - rat - 4 h - 40250 ppm
Dermal LD50
LD50 Dermal - rabbit - > 5,000 mg/kg

Other information on acute toxicity
No data available
Specific target organ toxicity - single exposure (Globally Harmonized System)
no data available

Specific target organ toxicity - repeated exposure (Globally Harmonized System)
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.

Aggravated: Avoid contact with DMSO solutions containing toxic materials or materials with unknown toxicological properties. Dimethyl sulfoxide is readily absorbed through skin and may carry such materials into the body.

Medical Condition:

Signs and Symptoms of Exposure

Effects due to ingestion may include: Nausea, Fatigue, Headache

Synergistic effects
no data available

Additional Information

RTECS: PV6210000

12. ECOLOGICAL INFORMATION

Toxicity

LC50 - Pimephales promelas (96h, static) - 96 h
LC50 - Oncorhynchus mykiss (rainbow trout) - 96 h

EC50 - Daphnia pulex (Water lettuce) - 27,500 mg/l

Persistence and degradability

Bioaccumulative potential
no data available

Mobility in soil
no data available

PBT and vPvB assessment
no data available

Other adverse effects
no data available

13. DISPOSAL CONSIDERATIONS

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
Disposal of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
NA-Number: 1993 Class: C3L Packing group: III

Proper shipping name: Combustible liquid, n.o.s. (Dimethyl sulfoxide) (Dimethyl sulfoxide)

Reportable Quantity (RQ):
Marine pollutant: No
Poison Inhalation Hazard: No

IMDG
Not dangerous goods

IATA
Not dangerous goods

15. REGULATORY INFORMATION

OSHA Hazards
Combustible Liquid, Target Organ Effect

SARA 302 Components
SARA 302: No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
SARA 313: This material does not contain any chemical components with known CAS numbers that exceed the threshold (Do Minimis) reporting levels established by SARA Title III, Section 313.

SARA 311/312 Hazards
Fire Hazard, Chronic Health Hazard

Massachusetts Right To Know Components
No components are subject to the Massachusetts Right to Know Act.

Pennsylvania Right To Know Components

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New Jersey Right To Know Components

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California Prop. 65 Components
This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

16. OTHER INFORMATION

Further Information
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The above information is believed to be accurate 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 sides of invoice or packing slip for additional terms and conditions of sale.