1. PRODUCT AND COMPANY IDENTIFICATION

Product name : Dimethyl sulfoxide
Product Number : D4540
Brand : Sigma
Supplier : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO  63103
USA
Telephone : +1 800-325-5832
Fax : +1 800-325-5052
Emergency Phone # (For both supplier and manufacturer) : (314) 776-6555
Preparation Information : Sigma-Aldrich Corporation
Product Safety - Americas Region
1-800-521-8956

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
Pictogram : none
Signal word : Warning
Hazard statement(s)
H227 Combustible liquid

Precautionary statement(s) : none

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

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

Potential Health Effects
Inhalation : May be harmful if inhaled. May cause respiratory tract irritation.
Skin : May be harmful if absorbed through skin. May cause skin irritation.
3. COMPOSITION/INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>Component</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimethyl sulfoxide</td>
<td>&lt;=100%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Synonyms</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>DMSO</td>
<td>Methyl sulfoxide</td>
</tr>
</tbody>
</table>

| Formula           | C₂H₆OS        |
| Molecular Weight  | 78.13 g/mol   |

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

**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.

**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 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>TWA</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: 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.

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
Colour colourless

Safety data
pH no data available
Melting point/freezing point: 16 - 19 °C (61 - 66 °F)
Boiling point: 189 °C (372 °F)
Flash point: 87 °C (189 °F) - closed cup
Ignition temperature: 301 °C (574 °F)
Auto-ignition temperature: no data available
Lower explosion limit: 3.5 %(V)
Upper explosion limit: 42 %(V)
Vapour pressure: 0.55 hPa (0.41 mmHg) at 20 °C (68 °F)
Density: 1.1 g/mL
Water solubility: completely miscible
Partition coefficient: n-octanol/water log Pow: -2.03
Relative vapour density: 2.70 - (Air = 1.0)
Odour: no data available
Odour Threshold: no data available
Evaporation rate: no data available

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

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

Genotoxicity in vitro - mouse - lymphocyte
Cytogenetic analysis
Genotoxicity in vitro - mouse - lymphocyte
Mutation in mammalian somatic cells.
Genotoxicity in vivo - rat - Intraperitoneal
Cytogenetic analysis
Genotoxicity in vivo - mouse - Intraperitoneal
DNA damage

Carcinogenicity
Carcinogenicity - rat - Oral
Tumorigenic: Equivocal tumorigenic agent by RTECS criteria. Skin and Appendages: Other: Tumors.
Carcinogenicity - mouse - Oral
Tumorigenic: Equivocal tumorigenic agent by RTECS criteria. Leukaemia Skin and Appendages: Other: 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.
ACGIH: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.
NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.
OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity
Reproductive toxicity - rat - Intraperitoneal
Effects on Fertility: Abortion.
Reproductive toxicity - rat - Intraperitoneal
Effects on Fertility: Post-implantation mortality (e.g., dead and/or resorbed implants per total number of implants).
Reproductive toxicity - rat - Subcutaneous
Effects on Fertility: Fetal-toxicity (except death, e.g., stunted fetus). Specific Developmental Abnormalities: Musculoskeletal system.

no data available

Teratogenicity
Developmental Toxicity - mouse - Intraperitoneal
Effects on Embryo or Fetus: Fetotoxicity (except death, e.g., stunted fetus). Specific Developmental Abnormalities: Musculoskeletal system.

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

Toxicity to fish
LC50 - Pimephales promelas (fathead minnow) - 34,000 mg/l - 96 h
LC50 - Oncorhynchus mykiss (rainbow trout) - 35,000 mg/l - 96 h

Toxicity to daphnia and other aquatic invertebrates
EC50 - Daphnia pulex (Water flea) - 27,500 mg/l

Persistence and degradability
no data available

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
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
NA-Number: 1993  Class: CBL  Packing group: III
Proper shipping name: Combustible liquid, n.o.s. (Dimethyl sulfoxide) (Dimethyl sulfoxide)
Marine pollutant: No
Poison Inhalation Hazard: No

IMDG
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 (De 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

<table>
<thead>
<tr>
<th>CAS-No.</th>
<th>Revision Date</th>
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</thead>
<tbody>
<tr>
<td>67-68-5</td>
<td>2007-03-01</td>
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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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