1. IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND OF THE COMPANY/UNDERTAKING

Product identifier
Product Name: Dimethyl Sulfoxide (DMSO)
Product Code: SC-202581

Recommended use of the chemical and restrictions on use
For research use only. Not intended for diagnostic or therapeutic use.

2. HAZARDS IDENTIFICATION

This chemical is considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200).

Classification
Flammable liquids: Category 4

Label elements
Signal word: Warning
Hazard statements: Combustible liquid

Precautionary Statements - Prevention
Keep away from heat/sparks/open flames/hot surfaces. — No smoking
Wear protective gloves/protective clothing/eye protection/face protection

Precautionary Statements - Response
IF exposed or concerned: Get medical advice/attention
In case of fire: Use CO2, dry chemical, or foam for extinction
Store in a well-ventilated place. Keep cool
Dispose of contents/container to an approved waste disposal plant

Precautionary Statements - Storage

Precautionary Statements - Disposal

Hazard not otherwise classified (HNOC)
Health hazards: 2
Flammability: 2
Stability: 0
Physical and chemical properties: -

HMIS
Health hazards: 0
Flammability: 2
Physical hazards: 0
Personal protection: -
3. COMPOSITION/INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>Chemical name</th>
<th>CAS No.</th>
<th>Weight-%</th>
<th>Oral LD50</th>
<th>Dermal LD50</th>
<th>Inhalation LC50</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimethyl Sulfoxide (DMSO)</td>
<td>67-68-5</td>
<td>&gt;98</td>
<td>= 14500 mg/kg (Rat)</td>
<td>= 40 g/kg (Rat)</td>
<td>&gt; 5.33 mg/L (Rat) 4 h</td>
</tr>
</tbody>
</table>

4. FIRST AID MEASURES

First Aid Measures

General advice
If symptoms persist, call a physician. Do not breathe dust/fume/gas/mist/vapors/spray. Do not get in eyes, on skin, or on clothing.

Eye contact
Immediately flush with plenty of water. After initial flushing, remove any contact lenses and continue flushing for at least 15 minutes. Keep eye wide open while rinsing. If symptoms persist, call a physician.

Skin Contact
Consult a physician if necessary. Wash off immediately with soap and plenty of water while removing all contaminated clothes and shoes. Wash contaminated clothing before reuse. Wash off immediately with plenty of water. If skin irritation persists, call a physician. Immediate medical attention is not required.

Inhalation
Remove to fresh air. Call a physician. If breathing is irregular or stopped, administer artificial respiration. Avoid direct contact with skin. Use barrier to give mouth-to-mouth resuscitation. Immediate medical attention is not required. Move to fresh air in case of accidental inhalation of vapors. If symptoms persist, call a physician. Move to fresh air in case of accidental inhalation of vapors or decomposition products.

Ingestion
Rinse mouth. Drink plenty of water. If symptoms persist, call a physician. Do NOT induce vomiting. Clean mouth with water and drink afterwards plenty of water. Never give anything by mouth to an unconscious person. Call a physician.

Self-protection of the first aider
Use personal protective equipment as required.

Most important symptoms and effects, both acute and delayed
Symptoms
No information available.

Indication of any immediate medical attention and special treatment needed
Note to physicians
Treat symptomatically.

5. FIRE-FIGHTING MEASURES

Suitable Extinguishing Media
Suitable Extinguishing Media

Unsuitable Extinguishing Media
No information available.

Specific hazards arising from the chemical
Specific hazards arising from the chemical
Keep product and empty container away from heat and sources of ignition. Risk of ignition.

Hazardous combustion products
Hydrogen sulfide. Carbon oxides.

Explosion data
Sensitivity to Mechanical Impact
No information available.

Sensitivity to Static Discharge
No information available.

Protective equipment and precautions for firefighters
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.
6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures

Personal precautions
Use personal protective equipment as required. Evacuate personnel to safe areas. Keep people away from and upwind of spill/leak. Remove all sources of ignition. Pay attention to flashback. Take precautionary measures against static discharges.

Environmental precautions
Prevent entry into waterways, sewers, basements or confined areas. Do not flush into surface water or sanitary sewer system. Prevent further leakage or spillage if safe to do so. Prevent product from entering drains. See Section 12 for additional Ecological Information.

Methods and material for containment and cleaning up

Methods for containment
Prevent further leakage or spillage if safe to do so.

Methods for cleaning up
Cover liquid spill with sand, earth or other non-combustible absorbent material. Cover powder spill with plastic sheet or tarp to minimize spreading. Pick up and transfer to properly labeled containers. Soak up with inert absorbent material. Dam up. Take precautionary measures against static discharges.

7. HANDLING AND STORAGE

Precautions for safe handling
Advice on safe handling
Avoid contact with skin, eyes or clothing. Use personal protective equipment as required. Wash contaminated clothing before reuse. Do not breathe dust/fume/gas/mist/vapors/spray. Do not eat, drink or smoke when using this product. Use with local exhaust ventilation. All equipment used when handling the product must be grounded. Keep away from heat/sparks/open flames/hot surfaces. — No smoking. Take necessary action to avoid static electricity discharge (which might cause ignition of organic vapors).

Conditions for safe storage, including any incompatibilities
Storage Conditions
Keep container tightly closed in a dry and well-ventilated place. Keep out of the reach of children. Keep containers tightly closed in a cool, well-ventilated place. Keep in properly labeled containers. Protect from moisture. Keep away from heat, sparks, flame and other sources of ignition (i.e., pilot lights, electric motors and static electricity). Keep away from heat. Store at room temperature.

Incompatible materials
None known based on information supplied.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Control parameters
Exposure Guidelines
This product, as supplied, does not contain any hazardous materials with occupational exposure limits established by the region specific regulatory bodies.

Appropriate engineering controls
Engineering Controls
Showers
Eyewash stations
Ventilation systems

Individual protection measures, such as personal protective equipment
Eye/face protection
Tight sealing safety goggles. Face protection shield.
Skin and Body Protection
Wear protective gloves and protective clothing.
Respiratory protection
If exposure limits are exceeded or irritation is experienced, NIOSH/MSHA approved respiratory protection should be worn. Positive-pressure supplied air respirators may be required for high airborne contaminant concentrations. Respiratory protection must be provided in accordance with current local regulations.
General Hygiene Considerations
When using do not eat, drink or smoke. Regular cleaning of equipment, work area and clothing is recommended.

9. PHYSICAL AND CHEMICAL PROPERTIES

<table>
<thead>
<tr>
<th>Property</th>
<th>Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical State</td>
<td>liquid</td>
</tr>
<tr>
<td>Appearance</td>
<td>No information available</td>
</tr>
<tr>
<td>Odor</td>
<td>Sulphurous May be unpleasant</td>
</tr>
<tr>
<td>pH</td>
<td>No information available</td>
</tr>
<tr>
<td>Melting point/freezing point</td>
<td>16 °C</td>
</tr>
<tr>
<td>Boiling point</td>
<td>189 °C</td>
</tr>
<tr>
<td>Flash point</td>
<td>87 °C</td>
</tr>
<tr>
<td>Liquid Density</td>
<td>1.10 g/mL</td>
</tr>
<tr>
<td>Evaporation rate</td>
<td>1.4</td>
</tr>
<tr>
<td>Upper flammability limits</td>
<td>42%</td>
</tr>
<tr>
<td>Lower flammability limit</td>
<td>3.5%</td>
</tr>
<tr>
<td>Vapor pressure</td>
<td>0.42 mmHg</td>
</tr>
<tr>
<td>Vapor density</td>
<td>2.7</td>
</tr>
<tr>
<td>Specific gravity</td>
<td>No information available</td>
</tr>
<tr>
<td>Water solubility</td>
<td>No information available</td>
</tr>
<tr>
<td>Solubility in other solvents</td>
<td>No information available</td>
</tr>
<tr>
<td>Partition coefficient</td>
<td>-2.03</td>
</tr>
<tr>
<td>Autoignition temperature</td>
<td>301 °C</td>
</tr>
<tr>
<td>Decomposition temperature</td>
<td>No information available</td>
</tr>
<tr>
<td>Kinematic viscosity</td>
<td>No information available</td>
</tr>
<tr>
<td>Explosive properties</td>
<td>No information available</td>
</tr>
<tr>
<td>Oxidizing properties</td>
<td>No information available</td>
</tr>
</tbody>
</table>

10. STABILITY AND REACTIVITY

| Reactivity                      | Not applicable                              |
| Chemical stability              | Stable under recommended storage conditions.|
| Possibility of Hazardous Reactions| None under normal processing.               |
| Hazardous polymerization        | No information available                    |
| Conditions to avoid             | Exposure to air or moisture over prolonged periods. Heat, flames and sparks. |
| Incompatible materials          | Strong oxidizing agents.                    |
| Hazardous Decomposition Products| Hydrogen sulfide. Carbon oxides.            |

11. TOXICOLOGICAL INFORMATION

Information on likely routes of exposure
Inhalation                           No data available.
Eye contact                          No data available.
Skin Contact                         No data available.
Ingestion                            No data available.

Information on toxicological effects
Symptoms                              No information available.

Delayed and immediate effects as well as chronic effects from short and long-term exposure
Chronic Toxicity                      Avoid repeated exposure.

Numerical measures of toxicity - Product Information
12. ECOLOGICAL INFORMATION

Ecotoxicity

May cause long lasting harmful effects to aquatic life

<table>
<thead>
<tr>
<th>Chemical name</th>
<th>Algae/aquatic plants</th>
<th>Fish</th>
<th>Toxicity to Microorganisms</th>
<th>Crustacea</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimethyl Sulfoxide (DMSO)</td>
<td>12350 - 25500: 96 h</td>
<td>41.7: 96 h Cyprinus carpio g/L LC50</td>
<td>-</td>
<td>7000: 24 h Daphnia species</td>
</tr>
<tr>
<td>67-68-5</td>
<td>Skeletonema costatum</td>
<td>40: 96 h Lepomis macrochirus g/L LC50</td>
<td>33 - 37: 96 h Oncorhynchus</td>
<td>mg/L EC50</td>
</tr>
<tr>
<td></td>
<td>EC50</td>
<td>static g/L LC50</td>
<td>mykiss g/L LC50 static</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>34000: 96 h Pimephales promelas mg/L</td>
<td>34000: 96 h</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>LC50 static</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

0% of the mixture consists of components(s) of unknown hazards to the aquatic environment.

Persistence and degradability No information available.
Bioaccumulation No information available.
Mobility No information available.

<table>
<thead>
<tr>
<th>Chemical name</th>
<th>Partition coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimethyl Sulfoxide (DMSO)</td>
<td>-2.03</td>
</tr>
<tr>
<td>67-68-5</td>
<td></td>
</tr>
</tbody>
</table>

13. DISPOSAL CONSIDERATIONS

Disposal of wastes
Disposal should be in accordance with applicable regional, national and local laws and regulations.

Contaminated packaging
Do not reuse container.

Other Information
Waste codes should be assigned by the user based on the application for which the product was used.

14. TRANSPORT INFORMATION

<table>
<thead>
<tr>
<th>DOT</th>
<th>IMDG</th>
<th>IATA</th>
</tr>
</thead>
<tbody>
<tr>
<td>UN/ID no</td>
<td>Not regulated</td>
<td>Not regulated</td>
</tr>
<tr>
<td>Hazard Class</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Combustible liquid</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Packing Group</td>
<td>III</td>
<td></td>
</tr>
<tr>
<td>Proper shipping name</td>
<td>Combustible liquid, n.o.s.</td>
<td>Combustible liquid, III</td>
</tr>
<tr>
<td>Description</td>
<td>NA1993, Combustible liquid, n.o.s., Combustible liquid, III</td>
<td></td>
</tr>
<tr>
<td>Emergency Response Guide Number</td>
<td>128</td>
<td></td>
</tr>
<tr>
<td>IMDG</td>
<td>Not regulated</td>
<td></td>
</tr>
<tr>
<td>IATA</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

15. REGULATORY INFORMATION

Unknown acute toxicity
No information available

The following values are calculated based on chapter 3.1 of the GHS document

ATEmix (oral) 14500 mg/kg
ATEmix (dermal) 40000 mg/kg
ATEmix (inhalation-vapor) 5.3
**International Inventories**

All of the components in the product are on the following Inventory lists:
- TSCA (United States)
- DSL/NDSL (Canada)
- Europe (EINECS/ELINCS/NLP)
- Australia (AICS)
- South Korea (KECL)
- China (IECSC)
- Japan (ENCS)
- Philippines (PICCS)

<table>
<thead>
<tr>
<th>Chemical name</th>
<th>TSCA</th>
<th>DSL</th>
<th>NDSL</th>
<th>EINECS</th>
<th>ELINCS</th>
<th>ENCS</th>
<th>IECSC</th>
<th>KECL</th>
<th>PICCS</th>
<th>AICS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimethyl Sulfoxide (DMSO)</td>
<td>X</td>
<td>X</td>
<td>-</td>
<td>X</td>
<td>-</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

- **X** - Listed

**TSCA** - United States Toxic Substances Control Act Section 8(b) Inventory

**DSL/NDSL** - Canadian Domestic Substances List/Non-Domestic Substances List

**EINECS/ELINCS** - European Inventory of Existing Chemical Substances/European List of Notified Chemical Substances

**ENCS** - Japan Existing and New Chemical Substances

**IECSC** - China Inventory of Existing Chemical Substances

**KECL** - Korean Existing and Evaluated Chemical Substances

**PICCS** - Philippines Inventory of Chemicals and Chemical Substances

**US Federal Regulations**

**SARA 313**

Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA). This product does not contain any chemicals which are subject to the reporting requirements of the Act and Title 40 of the Code of Federal Regulations, Part 372.

**SARA 311/312 Hazard Categories**

- **Acute health hazard**: Yes
- **Chronic Health Hazard**: No
- **Fire hazard**: Yes
- **Sudden release of pressure hazard**: No
- **Reactive hazard**: No

**CWA (Clean Water Act)**

This product does not contain any substances regulated as pollutants pursuant to the Clean Water Act (40 CFR 122.21 and 40 CFR 122.42).

**US State Regulations**

**California Proposition 65**

This product does not contain any Proposition 65 chemicals.

**U.S. State Right-to-Know Regulations**

<table>
<thead>
<tr>
<th>Chemical name</th>
<th>New Jersey</th>
<th>Massachusetts</th>
<th>Pennsylvania</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimethyl Sulfoxide (DMSO) 67-68-5</td>
<td>X</td>
<td>Not Listed</td>
<td>Not Listed</td>
</tr>
</tbody>
</table>

**16. OTHER INFORMATION**

**Revision note**

No information available

**Disclaimer**

The information provided in this Material 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 Safety Data Sheet