SAFETY DATA SHEET

01706 - Dimethylsulphoxide (DMSO)

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

Product identifier

Product Name
Dimethylsulphoxide (DMSO)

Other means of identification

Catalog Number
01706

UN/ID no.
1993

Document Number
DX20824

Synonyms
None

Recommended use of the chemical and restrictions on use

Recommended Use
Laboratory reagent

STEMCELL TECHNOLOGIES INC.'S QUALITY MANAGEMENT SYSTEM IS CERTIFIED TO ISO 13485. PRODUCTS ARE FOR RESEARCH USE ONLY AND NOT INTENDED FOR HUMAN OR ANIMAL DIAGNOSTIC OR THERAPEUTIC USES UNLESS OTHERWISE STATED.

Details of the supplier of the safety data sheet

Manufacturer/Supplier
STEMCELL Technologies Canada Inc.
Suite 500 - 1618 Station Street
Vancouver, British Columbia V6A 1B6 Canada

Emergency telephone number

Emergency Telephone 1-800-667-0322

2. HAZARDS IDENTIFICATION

Classification

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

Flammable liquids
Category 4

Hazards not otherwise classified (HNOC)
Not applicable

Label elements
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Revision Date 16-May-2018
Revision Number 2

Warning

Hazard statements
Combustible liquid

Appearance Clear Physical state Liquid Odor No information available

Precautionary Statements - Prevention
Keep away from flames and hot surfaces. - No smoking
Wear protective gloves/eye protection/face protection

Precautionary statements - Response
In case of fire: Use CO2, dry chemical, or foam to extinguish

Precautionary Statements - Storage
Store in a well-ventilated place. Keep cool

Precautionary Statements - Disposal
Dispose of contents/container to an approved waste disposal plant

Other Information
Not applicable

Unknown acute toxicity 100 % of the mixture consists of ingredient(s) of unknown toxicity
  0 % of the mixture consists of ingredient(s) of unknown acute oral toxicity
  0 % of the mixture consists of ingredient(s) of unknown acute dermal toxicity
  100 % of the mixture consists of ingredient(s) of unknown acute inhalation toxicity (gas)
  100 % of the mixture consists of ingredient(s) of unknown acute inhalation toxicity (vapor)
  100 % of the mixture consists of ingredient(s) of unknown acute inhalation toxicity (dust/mist)

3. COMPOSITION/INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>Substance</th>
<th>Chemical name</th>
<th>CAS No.</th>
<th>Weight-%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimethyl Sulfoxide (DMSO)</td>
<td>67-68-5</td>
<td></td>
<td>100</td>
</tr>
</tbody>
</table>

*The exact percentage (concentration) of composition has been withheld as a trade secret.

4. FIRST AID MEASURES

Description of first aid measures

Inhalation
Remove to fresh air.

Eye contact
Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Keep eye wide open while rinsing. Do not rub affected area. Remove contact lenses, if present and easy to do. Continue rinsing.

Skin contact
Wash off immediately with soap and plenty of water while removing all contaminated clothes and shoes.

Ingestion
Clean mouth with water and drink afterwards plenty of water.

Self-protection of the first aider
Remove all sources of ignition. Ensure that medical personnel are aware of the material(s) involved, take precautions to protect themselves and prevent spread of contamination. Wear personal protective clothing (see section 8).

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
Dry chemical. Carbon dioxide (CO2). Water spray. Alcohol resistant foam.

Unsuitable extinguishing media
CAUTION: Use of water spray when fighting fire may be inefficient.

Specific hazards arising from the chemical
Keep product and empty container away from heat and sources of ignition. In the event of fire, cool tanks with water spray.

Explosion data
Sensitivity to Mechanical Impact
None.

Sensitivity to Static Discharge
Yes.

Special protective equipment for fire-fighters
Firefighters should wear self-contained breathing apparatus and full firefighting turnout gear. Use personal protection equipment.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures

Personal precautions
Evacuate personnel to safe areas. Use personal protective equipment as required. See section 8 for more information. Take precautionary measures against static discharges. Do
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not touch or walk through spilled material.

Environmental precautions

Refer to protective measures listed in Sections 7 and 8. Prevent further leakage or spillage if safe to do so.

Methods and material for containment and cleaning up

Stop leak if you can do it without risk. Do not touch or walk through spilled material. Dike far ahead of liquid spill for later disposal.

Take precautionary measures against static discharges. Dam up. Soak up with inert absorbent material. Pick up and transfer to properly labeled containers.

Clean contaminated objects and areas thoroughly observing environmental regulations.

7. HANDLING AND STORAGE

Precautions for safe handling

Use personal protection equipment. Do not breathe vapor or mist. Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. Take precautionary measures against static discharges. Use with local exhaust ventilation.

Conditions for safe storage, including any incompatibilities

Keep containers tightly closed in a dry, cool and well-ventilated place. Keep away from heat, sparks, flame and other sources of ignition (i.e., pilot lights, electric motors and static electricity). Keep in properly labeled containers. Store in accordance with the particular national regulations. Store in accordance with local regulations.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Control parameters

The following ingredients are the only ingredients of the product above the cut-off level (or level that contributes to the hazard classification of the mixture) which have an exposure limit applicable in the region for which this safety data sheet is intended or other recommended limit. At this time, the other relevant constituents have no known exposure limits from the sources listed here.
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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.

Skin and body protection
No special protective equipment required.

Respiratory protection
No protective equipment is needed under normal use conditions. If exposure limits are exceeded or irritation is experienced, ventilation and evacuation may be required.

General hygiene considerations
Do not eat, drink or smoke when using this product. Contaminated work clothing should not be allowed out of the workplace. Regular cleaning of equipment, work area and clothing is recommended. Wash hands before breaks and immediately after handling the product.

9. PHYSICAL AND CHEMICAL PROPERTIES

Information on basic physical and chemical properties

<table>
<thead>
<tr>
<th>Property</th>
<th>Values</th>
<th>Remarks • Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical state</td>
<td>Liquid</td>
<td>None known</td>
</tr>
<tr>
<td>Appearance</td>
<td>Clear</td>
<td>None known</td>
</tr>
<tr>
<td>Color</td>
<td>No information available</td>
<td>None known</td>
</tr>
<tr>
<td>Odor</td>
<td>No information available</td>
<td>None known</td>
</tr>
<tr>
<td>Odor threshold</td>
<td>No information available</td>
<td>None known</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Property</th>
<th>Values</th>
<th>Remarks • Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>pH</td>
<td>No data available</td>
<td>None known</td>
</tr>
<tr>
<td>Melting point / freezing point</td>
<td>16 -19 °C / 61 - 66 °F</td>
<td>None known</td>
</tr>
<tr>
<td>Boiling point / boiling range</td>
<td>189 °C / 372 °F</td>
<td>None known</td>
</tr>
<tr>
<td>Flash point</td>
<td>87 °C / 189 °F</td>
<td>None known</td>
</tr>
<tr>
<td>Evaporation rate</td>
<td>No data available</td>
<td>None known</td>
</tr>
<tr>
<td>Flammability (solid, gas)</td>
<td>No data available</td>
<td>None known</td>
</tr>
<tr>
<td>Flammability Limit in Air</td>
<td></td>
<td>None known</td>
</tr>
<tr>
<td></td>
<td>Upper flammability limit: 42 %(V)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Lower flammability limit: 3.5 %(V)</td>
<td></td>
</tr>
<tr>
<td>Vapor pressure</td>
<td>0.55 hPa (0.41 mmHg) at 20 °C (68 °F)</td>
<td>None known</td>
</tr>
<tr>
<td>Vapor density</td>
<td>2.70 · (Air = 1.0)</td>
<td>None known</td>
</tr>
<tr>
<td>Relative density</td>
<td>1.1 g/mL</td>
<td>None known</td>
</tr>
<tr>
<td>Water solubility</td>
<td>completely miscible</td>
<td>None known</td>
</tr>
<tr>
<td>Solubility in other solvents</td>
<td>No data available</td>
<td>None known</td>
</tr>
<tr>
<td>Partition coefficient</td>
<td>log Pow: -2.03</td>
<td></td>
</tr>
</tbody>
</table>
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Autoignition temperature No data available
Decomposition temperature No data available None known
Kinematic viscosity No data available None known
Dynamic viscosity No data available None known
Explosive properties No information available
Oxidizing properties No information available

Other Information
Softening point No information available
Molecular weight 78.13 g/mol
Molecular formula C2H6OS
VOC Content (%) No information available
Liquid Density No information available
Bulk density No information available

10. STABILITY AND REACTIVITY

Reactivity No information available.
Chemical stability Stable under normal conditions.
Possibility of hazardous reactions None under normal processing.
Conditions to avoid Heat, flames and sparks.
Incompatible materials None known based on information supplied.
Hazardous decomposition products Hazardous decomposition products formed under fire conditions: Carbon oxides, Sulphur oxides.

11. TOXICOLOGICAL INFORMATION

Information on likely routes of exposure

Product Information

Inhalation May be harmful by inhalation. May cause irritation of respiratory tract.
Eye contact May cause eye irritation.
Skin contact May be harmful if absorbed through the skin. May cause skin irritation and/or dermatitis.
Ingestion May be harmful if swallowed.

Symptoms related to the physical, chemical and toxicological characteristics

Symptoms Exposure to large amounts can cause;, redness of skin, itching, burning, sedation, headache, nausea, dizziness.
Numerical measures of toxicity

Acute toxicity

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

<table>
<thead>
<tr>
<th></th>
<th>ATEmix (oral)</th>
<th>ATEmix (dermal)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>14,500.00 mg/kg</td>
<td>40,000.00 mg/kg</td>
</tr>
</tbody>
</table>

Unknown acute toxicity

100 % of the mixture consists of ingredient(s) of unknown toxicity

0 % of the mixture consists of ingredient(s) of unknown acute oral toxicity

0 % of the mixture consists of ingredient(s) of unknown acute dermal toxicity

100 % of the mixture consists of ingredient(s) of unknown acute inhalation toxicity (gas)

100 % of the mixture consists of ingredient(s) of unknown acute inhalation toxicity (vapor)

100 % of the mixture consists of ingredient(s) of unknown acute inhalation toxicity (dust/mist)

Component Information

<table>
<thead>
<tr>
<th>Chemical name</th>
<th>Oral LD50</th>
<th>Dermal LD50</th>
<th>Inhalation LC50</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimethyl Sulfoxide (DMSO) 67-68-5</td>
<td>= 14500 mg/kg (Rat) = 28300 mg/kg (Rat)</td>
<td>= 40 g/kg (Rat)</td>
<td>&gt; 5.33 mg/L (Rat) 4 h</td>
</tr>
</tbody>
</table>

Delayed and immediate effects as well as chronic effects from short and long-term exposure

- Skin corrosion/irritation: No information available.
- Serious eye damage/eye irritation: No information available.
- Respiratory or skin sensitization: No information available.
- Germ cell mutagenicity: No information available.
- Carcinogenicity: No information available.
- Reproductive toxicity: No information available.
- Developmental toxicity: Developmental Toxicity - Mouse - Intraperitoneal Effects on Embryo or Fetus: Fetotoxicity (except death, e.g., stunted fetus). Specific Developmental Abnormalities: Musculoskeletal system.
- STOT - single exposure: No information available.
- STOT - repeated exposure: No information available.
- Aspiration hazard: No information available.
- RTECS #: PV6210000
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12. ECOLOGICAL INFORMATION

<table>
<thead>
<tr>
<th>Chemical name</th>
<th>Ecotoxicity</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) 67-68-5</td>
<td></td>
<td>EC50: 12350 - 25500mg/L (96h, Skeletonema costatum)</td>
<td>LC50: &gt;40g/L (96h, Lepomis macrochirus)</td>
<td>-</td>
<td>EC50: =7000mg/L (24h, Daphnia species)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>LC50: 33 - 37g/L (96h, Oncorhynchus mykiss)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>LC50: =41.7g/L (96h, Cyprinus carpio)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>LC50: =34000mg/L (96h, Pimephales promelas)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Persistence and degradability</td>
<td>No information available.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bioaccumulation</td>
<td></td>
<td>There is no data for this product.</td>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>

Component Information

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

Other adverse effects | No information available.

13. DISPOSAL CONSIDERATIONS

Waste treatment methods

| Waste from residues/unused products | Dispose of in accordance with local regulations. Dispose of waste in accordance with environmental legislation. |
| Contaminated packaging | Do not reuse empty containers. |

14. TRANSPORT INFORMATION

DOT

<table>
<thead>
<tr>
<th>UN/ID no.</th>
<th>Proper shipping name</th>
<th>Hazard class</th>
</tr>
</thead>
<tbody>
<tr>
<td>1993</td>
<td>Combustible liquid, n.o.s. (Dimethyl sulfoxide)</td>
<td>None</td>
</tr>
</tbody>
</table>

Not regulated
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Packing Group

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>TDG</td>
<td>Not regulated</td>
</tr>
<tr>
<td>MEX</td>
<td>Not regulated</td>
</tr>
<tr>
<td>ICAO (air)</td>
<td>Not regulated</td>
</tr>
<tr>
<td>IATA</td>
<td>Not regulated</td>
</tr>
<tr>
<td>IMDG</td>
<td>Not regulated</td>
</tr>
<tr>
<td>RID</td>
<td>Not regulated</td>
</tr>
<tr>
<td>ADR</td>
<td>Not regulated</td>
</tr>
<tr>
<td>ADN</td>
<td>Not regulated</td>
</tr>
</tbody>
</table>

15. REGULATORY INFORMATION

International Inventories

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>TSCA</td>
<td>Complies</td>
</tr>
<tr>
<td>DSL/NDSL</td>
<td>Complies</td>
</tr>
<tr>
<td>EINECS/ELINCS</td>
<td>Complies</td>
</tr>
<tr>
<td>ENCS</td>
<td>Complies</td>
</tr>
<tr>
<td>IECSC</td>
<td>Complies</td>
</tr>
<tr>
<td>KECL</td>
<td>Complies</td>
</tr>
<tr>
<td>PICCS</td>
<td>Complies</td>
</tr>
<tr>
<td>AICS</td>
<td>Complies</td>
</tr>
</tbody>
</table>

Legend:

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
AICS - Australian Inventory of 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

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td>Acute health hazard</td>
<td>No</td>
</tr>
<tr>
<td>Chronic Health Hazard</td>
<td>No</td>
</tr>
</tbody>
</table>
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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).

CERCLA
This material, as supplied, does not contain any substances regulated as hazardous substances under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302) or the Superfund Amendments and Reauthorization Act (SARA) (40 CFR 355). There may be specific reporting requirements at the local, regional, or state level pertaining to releases of this material.

US State Regulations

California Proposition 65
This product does not contain any Proposition 65 chemicals.

U.S. State Right-to-Know Regulations

US State 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)</td>
<td>X</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>67-68-5</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

U.S. EPA Label Information

EPA Pesticide Registration Number Not applicable

16. OTHER INFORMATION, INCLUDING DATE OF PREPARATION OF THE LAST REVISION

Prepared By, Quality Control. STEMCELL Technologies Canada Inc.

Revision Date 16-May-2018

Revision Note No information available.

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. STEMCELL Technologies Inc. shall not be held liable for any...
damage resulting from handling or from contact with the product.

End of Safety Data Sheet