



## Material Safety Data Sheet

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MSDS Prepared: May 2, 2007

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### Cryoserv® - DIMETHYL SULFOXIDE (DMSO)

#### 1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME: Dimethyl Sulfoxide (DMSO) CHEMICAL NAME: Dimethyl Sulfoxide  
SYNONYMS/TRADE NAMES: Enviro S®, dimethyl sulphoxide, methyl sulfoxide, sulfinylbis  
[methane]

MOLECULAR FORMULA: C<sub>2</sub>H<sub>6</sub>O S MOLECULAR WEIGHT: 78.13

USE of the substance: Solvent for manufacture of pharmaceuticals, fine chemicals and polymers.

#### 2. COMPOSITION/INFORMATION ON INGREDIENTS

Hazardous Ingredients	CAS No	EINECS	Weight %	OSHA PEL	ACGIH TLV®
Dimethyl Sulfoxide	67-68-5	200-664-3	99%	Not established	Not established

NTP/IARC/OSHA CARCINOGEN: No

EC Classifications (R or S phrases): None Required

#### 3. HAZARDS IDENTIFICATION

WARNING! COMBUSTIBLE LIQUID AND VAPOR

PHYSICAL APPEARANCE: Clear liquid

ODOR: Essentially odorless

EFFECTS OF OVEREXPOSURE:

General: DMSO has shown very few toxic symptoms in humans. The most common are nausea, skin rashes and an unusual garlic-onion-oyster smell on body and breath.

Inhalation: High vapor concentrations may cause headache, dizziness, and sedation.

Eyes: Low hazard for usual industrial/ commercial handling by trained personnel.

Skin: Stinging and burning of the skin as well as rashes and vesicles have been

seen. A heat reaction may occur if applied to wet skin. Avoid contact with DMSO solutions containing toxic material or materials whose toxicological properties are not known. DMSO easily penetrates the skin and may enhance the rate of skin absorption of skin-permeable substances. But because of DMSO's low toxicity and its inability to carry less-permeable substances with it through the skin, it can be concluded that DMSO does not pose a significant threat by skin absorption.

Ingestion: A low ingestion hazard.

HMIS AND NFPA HAZARD RATINGS: Health - 1, Flammability - 1, Chemical Reactivity - 0

Note: HMIS and NFPA ratings involve data and interpretations that may vary from company to company. In both cases the lower the number, the less the hazard. They are intended only for rapid, general identification of the magnitude of the specific hazard. To deal adequately with the safe handling of this material, all the information contained in this MSDS must be considered.

#### **4. FIRST AID MEASURES**

NEVER GIVE FLUIDS OR INDUCE VOMITING IF PATIENT IS UNCONSCIOUS OR IS HAVING CONVULSIONS.

General advice: Remove contaminated clothing promptly (launder before reuse).

Eye Contact: Flush thoroughly with running water (including under eyelids) for at least 15 minutes. If irritation persists after flushing, seek medical attention.

Skin Contact: Wash contaminated skin with water. Seek medical attention if irritation persists.

Ingestion: Seek immediate medical care. Do not induce vomiting.

Inhalation: Remove to fresh air. If breathing has stopped, provide artificial respiration, keep the victim warm and seek medical attention.

Special advice: In general, DMSO is not dangerous to people, but like any other chemical, it should be treated with care, respect and common sense.

#### **5. FIRE-FIGHTING MEASURES**

Combustible liquid and vapor

Extinguishing Media: Foam, carbon dioxide, dry powder, and water spray.

Special protective equipment for fire-fighters: Wear a self-contained Breathing Apparatus (SCBA).

Special Exposure Hazards: Burning dimethyl sulfoxide produces poisonous gases (sulfur oxides). Wear rubber gloves, SCBA, and rubber suit.

Flashpoint and method:

89°C (192°F) closed cup

95°C (203°F) open cup

Flammable Limits (% in air):

LEL: 3.0 - 3.5% by volume

UEL: 42 - 63% by volume

Autoignition Temperature:

300-302°C (572-575°F)

Spill, Leak, or Release:

Note: Review sections 3, 4, and 5 of this MSDS before proceeding with clean up. Use appropriate PERSONAL PROTECTIVE EQUIPMENT during clean up.

## **6. ACCIDENTAL RELEASE MEASURES**

### Personal Precautions:

In case of mist formation use a respirator or Self-Contained Breathing Apparatus (SCBA).

### Environmental Precautions:

If a spill or leak occurs, immediately consult your environmental supervisor. Remove ignition sources. Ventilate the area. Do not breathe the vapor or get liquid in eyes or on skin/clothing.

### Spill Clean-up Methods:

Dilute and flush to wastewater treatment or absorb with inert material. Do not allow the material to enter streams or waterways.

### Recommended Decontamination Facilities:

Eye bath, water washing facilities

## **7. HANDLING AND STORAGE**

### Usage/Handling Precautions:

Keep away from sources of ignition. No Smoking. Do not breathe vapor or mist. Avoid contact with skin, eyes, or clothing.

### Storage Precautions:

Keep container tightly closed, in a well-ventilated place. Freezes (solidifies) at 18°C (64°F)

## **8. EXPOSURE CONTROLS/PERSONAL PROTECTION**

### Exposure Limits:

ACGIH Threshold Limit Value (TLV): not established

OSHA (USA) Permissible Exposure Limit (PEL, 1989 Table Z-1-A values or section-specific standards): not established

AIHA Workplace Environmental Exposure Level "WEEL" guideline for airborne concentrations in the workplace: 250 ppm (8-hr TWA)

### Ventilation:

Good general ventilation (typically 10 air changes per hour) should be used. Ventilation rates should be matched to conditions. Use process enclosures, local exhaust ventilation, or other engineering controls to maintain ventilation.

### Respiratory Protection:

In case of mist formation use a respirator or SCBA. Respirator type: organic vapor. If respirators are used, a program should be instituted to assure compliance with OSHA standards.

Hand Protection: Butyl rubber or nitrile (NBR) rubber gloves.

Eye Protection: Lightly fitting safety goggles.

## 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance: colorless liquid

Odor: essentially odorless

Odor Threshold: not available

pH: 8.5 (50/50 in water)

Boiling Point: 189°C (372°F)

Flashpoint and method: 89°C (192°F) closed cup                      95°C (203°F) open cup

Flammable Limits (% in air): LEL: 3.0 - 3.5% by volume

UEL: 42-63% by volume

Autoignition Temperature: 300-302°C (572-575°F)

Vapor Pressure: 0.55 mbar (0.46 mmHg) @ 20°C (68°F)

Specific Gravity: 1.1 at 20°C (68°F) (water = 1)

Solubility in water at 20°C: miscible

Octanol/Water Partition Coefficient: logPow = -2.03

Viscosity at 25°C (77°F): 2.0 mPa.s or cP

Vapor Density (Air = 1): 2.7

Evaporation rate (n-butyl acetate = 1): 0.026

Melting Point: 18°C (64°F)

Sensitivity to Static Discharge: Material is unlikely to accumulate a static charge, which could act as an ignition source.

## 10. STABILITY AND REACTIVITY

Stability: Stable

Conditions to avoid: Prolonged heating above 150°C (302°F) can cause rapid, exothermic decomposition

Materials to avoid: Organic and inorganic acid chlorides, strong oxidizing agents, alkali metals, hydrobromic acid, acidic solutions of alkali bromides

Hazardous decomposition products: Sulfur dioxide, formaldehyde, methyl mercaptan, dimethyl sulfide, dimethyl disulfide, and bis (methylthio) methane

Hazardous polymerization: Will not occur. No stabilizers are needed or present.

## 11. TOXICOLOGICAL INFORMATION

Data for Dimethyl Sulfoxide:

Acute Toxicity Data:

Oral LD-50 (male rat): 14,500-28,300 mg/kg

Inhalation (rat): No mortality rate @ 2,900 mg/m<sup>3</sup> (900 ppm)/24 hrs.

Dermal LD-50 (rat): 40,000 mg/kg

Skin irritation (human): Mild

Repeated skin application (human): Slight irritation

Skin sensitization (human): None by EC protocols

Eye irritation (human): None by EC protocols

Subchronic Toxicity Data:\*\*

Oral study (13 weeks, rat): LOEL = 8800 mg/kg/day (minor target organ effects: liver)  
(reduced body weight gain): NOEL = 1100 mg/kg/day

Inhalation study (6 weeks, rat): NOEL = 60ppm

\*\* Note - definitions for data:

LOEL = lowest observed effect level  
NOAEL = no observed adverse effect level  
NOEL = no observed effect level.

#### Developmental Toxicity Data:

DMSO is not considered to be directly embryotoxic and has been shown to be a successful cryoprotectant for mammalian semen and embryos.

A mouse teratology NOEL of 12 g/kg/day has been established based on research with a 50% DMSO solution administered orally. Teratology data suggests that:

1. DMSO is not a teratogen to mammals when administered via oral and dermal routes at dose level that do not produce overt maternal toxicity.
2. DMSO is not a teratogen at low dose levels regardless of the route of administration.
3. The teratogenic potential of DMSO is dependent on route of administration, the dose level and the gestational time of exposure, but in all cases is extremely low or non-existent.

#### Mutagenicity/Genotoxicity Data:

Salmonella typhimurium assay (Ames test): negative (+/- activation). DMSO is used as a neutral solvent in the Ames mutagen test.

## 12. ECOLOGICAL INFORMATION

#### Introduction:

This environmental effects summary is written to assist in addressing emergencies created by an accidental spill which might occur during shipment or handling of this material. It is not meant to address discharges to sanitary sewers or publicly owned treatment works.

#### Aquatic Toxicity:

The LC50 (96 hrs.) for ten species of fish range from 32,500 to 43,000 ppm. The LC50 for two species of protozoans are 32,000 and 38,000 ppm. The concentration required to inhibit growth (EC50) for five species of blue-green algae and one green algae species ranged from 0.4 to 4.0%. DMSO is non-bio-accumulating since the log of the octanol/water partition coefficient is -2.03.

#### Phytotoxicity:

Soaking tomato, cucumber, and bean seeds for 18hrs in up to 8% DMSO solutions had no effect on germination rate. DMSO has no effect on the growth rate of corn when sprayed on at rates up to 30 gallon/acre. When diluted with a large amount of water, release of DMSO, directly or indirectly, to the environment is not expected to have significant effect.

#### Biological Oxygen Demand:

Theoretical Oxygen Demand at 10 ppm: 123 mg oxygen

Chemical Oxygen Demand at 10 ppm: 107 mg/l

Biological Oxygen Demand-5 at 10 ppm: <1.0 mg/l

## 13. DISPOSAL CONSIDERATIONS

## Disposal Methods

### Waste Disposal:

Dilute and flush to an approved wastewater treatment system. Bacterial decomposition of dimethyl sulfoxide during wastewater treatment can result in the release of dimethyl sulfide (a volatile substance with a strong disagreeable odor). Waste DMSO can also be incinerated in an approved furnace where permitted. Consult federal, state or local authorities for proper disposal procedures.

### Empty Containers:

Should be transported/delivered using a registered waste carrier for recycling or waste disposal in accordance with local regulations.

## 14. TRANSPORT INFORMATION

### DOT (USA) Status:

Bulk (>119 gallons per container)

Proper shipping name: Combustible liquid, N.O.S. (Dimethyl Sulfoxide)

Hazard Class: Combustible liquid

I.D. Number: NA 1993

Packing Group: III

Reportable Quantity: N/A

Placards: 1993 (Combustible)

Quantity limitations: None

Drum (<119 gallons per container)

Proper shipping name: Dimethyl Sulfoxide

Hazard Class: Not regulated

I.D. Number: None

Packing Group: None

Label(s): None

TDG (Canada) Status: unregulated.

ICAO - International Civil Aviation Organization status: unregulated

IATA - International Air Transport Agency status: unregulated

ADR and IMDG - International Dangerous Goods status: unregulated

## 15. REGULATORY INFORMATION

This document has been prepared in accordance with the MSDS requirements of the OSHA Hazard Communication Standard 29 CFR 1910.1200.

Occupational Safety and Health Administration "OSHA" hazardous chemical(s): Dimethyl sulfoxide

Material(s) known to the State of California to cause cancer: None

Material(s) known to the State of California to cause adverse reproductive effects: None

Massachusetts Substance List: None

New Jersey Workplace Hazardous Substance List: None

Pennsylvania Hazardous Substance List: None

This document has been prepared in accordance with the MSDS requirements of the WHMIS Controlled Products Regulation.

WHMIS (Canada) Ingredient Disclosure List: Listed

WHMIS9 (Canada) Status: Regulated

WHMIS (Canada) Hazard Classification: None

IARC - International Agency for Research on Cancer Carcinogenicity Classification (components present at 0.1% or more): Not Listed

ACGIH - American Conference of Governmental Industrial Hygienists: Not Listed

NTP - National Toxicology Program: Not listed

Reporting requirements of Section 313 or Title III of the superfund Amendments and Reauthorization Act (SARA) of 1986 and 40 CFR Part 372: None

SARA (U.S.A.) Sections 311 and 312 hazard classification(s): fire hazard

TSCA - US Toxic Substances Control Act: This product is listed on the TSCA inventory.

CEPA/DSL - Canadian Environmental Protection Act/ Domestic Substances List: Listed.

EINECS - European Inventory of Existing Commercial Chemical Substances: No. 200-664-3

AICS/NICNAS - Australian Inventory of Chemical Substances/National Industrial Chemical notification and Assessment Scheme: This product is listed on AICS.

Japanese Handbook of Existing and New Chemical Substances: Listed.

EC Classification and User Label Information (Council Directive 67/548/EEC and 1999/45/EC): Hazard Symbols and Risk Phrases – None Required

ICH (International Council on Harmonization): Class III – Solvent with low toxic potential

## **16. OTHER INFORMATION**

US/CANADIAN Label Statements:

**WARNING! COMBUSTIBLE LIQUID AND VAPOR**

**HIGH VAPOR CONCENTRATIONS MAY CAUSE DROWSINESS**

Store away from heat and light.

Distill with caution.

Keep away from heat and flame.

Avoid breathing high vapor concentrations.

Keep container closed.

Use with adequate ventilation and proper protective equipment given elsewhere in this MSDS.

**FIRST AID:**

If inhaled, move to fresh air. Treat symptomatically. Get medical attention if symptoms persist.

**IN CASE OF FIRE:**

Eliminate all ignition sources. Flush spill area with water spray. Prevent runoff from entering drains, sewers, and streams.

Since emptied containers retain product residue, follow label warnings even after container is emptied.

**CAUTION:**

**FOR MANUFACTURING, PROCESSING OR REPACKAGING BY TRAINED PERSONNEL**

MSDS Issue Date: March 19, 2008      Compiled by: Dan Robins

Supersedes MSDS Dated: July 22, 2002

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