

6



SIGMA-ALDRICH

Material Safety Data Sheet

Date Printed: 08/09/2005
Date Updated: 06/10/2005
Version 1.70

Section 1 - Product and Company Information

Product Name Dimethyl Sulfoxide, Biotechnology Performance Certified
Product Number D2438
Brand Sigma Chemical

Company Sigma-Aldrich
Street Address 3050 Spruce Street
City, State, Zip, Country SAINT LOUIS, MO 63103 US
Technical Phone: 314 771 5765
Fax: 800 325 5052
Emergency Phone: 414 273 3850 Ext. 5996

Section 2 - Composition/Information on Ingredient

Substance Name	CAS #	SARA 313	EC no	Annex I Index Number
DIMETHYL SULFOXIDE, MEETS USP TESTING SPECS.	67-68-5	No	200-664-3	

Formula C₂H₆O_S
Synonyms A 10846, Deltan, Demeso, Demasorb, Demavet, Demsodrox, Dermasorb, Dimethyl sulfoxide, Dimethyl sulphoxide, Dimexide, Dipiratriol-tropico, DMS-70, DMS-90, DMSO, Dolcur, Domoso, Dromisol, Durasorb, Gamisol 90, Hyadur, Infiltrina, M 176, Methane, sulfinylbis-, Methylsulfinylmethane, NSC-763, Rimso-50, Somipront, SQ 9453, Sulfinylbis(methane), Syntexan, Topsy

Section 3 - Hazards Identification

Emergency Overview

Readily absorbed through skin. Target organ(s): Eyes. Skin. Combustible.

HMIS Rating

Health: 0* Flammability: 2 Reactivity: 1

NFPA Rating

Health: 0 Flammability: 2 Reactivity: 1

*additional chronic hazards present.

For additional information on toxicity, please refer to Section 11.

Section 4 - First Aid Measures

Oral Exposure

If swallowed, wash out mouth with water provided person is conscious. Call a physician.

Inhalation Exposure

If inhaled, remove to fresh air. If not breathing give artificial respiration. If breathing is difficult, give oxygen.

Dermal Exposure

In case of contact, immediately wash skin with soap and copious amounts of water.

Eye Exposure

In case of contact, immediately flush eyes with copious amounts of water for at least 15 minutes.

Section 5 - Fire Fighting Measures

Flash Point: 188.6 °F 87 °C
Explosion Limits: Lower: 3.5 % Upper: 42 %
Autoignition Temp: 301 °C

Extinguishing Media

Suitable

Water spray, Carbon dioxide, dry chemical powder, or appropriate foam.

Firefighting

Protective Equipment

Wear self-contained breathing apparatus and protective clothing to prevent contact with skin and eyes.

Specific Hazard(s)

Combustible liquid. Emits toxic fumes under fire conditions.

Section 6 - Accidental Release Measures

Procedure to be Followed in Case of Leak or Spill

Evacuate area.

Procedure(s) of Personal Precaution(s)

Wear respirator, chemical safety goggles, rubber boots, and heavy rubber gloves.

Methods for Cleaning Up

Cover with dry-lime, sand, or soda ash. Place in covered containers using non-sparking tools and transport outdoors. Ventilate area and wash spill site after material pickup is complete.

Section 7 - Handling and Storage

Handling

User Exposure

Do not breathe vapor. 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. Avoid prolonged or repeated exposure.

Storage

Suitable

Keep tightly closed. Keep away from heat and open flame.

Special Requirements

Hygroscopic.

Section 8 - Exposure Controls / PPE

Engineering Controls

Safety shower and eye bath. Mechanical exhaust required.

Personal Protective Equipment

Respiratory

Government approved respirator.

Hand

Compatible chemical-resistant gloves.

Sigma Chemical - D2438

Page 2

Sigma-Aldrich Corporation
www.sigma-aldrich.com

RECEIVED

AUG 15 2005

Safety and Environmental
Health

Eye
Chemical safety goggles.
Skin-Specific
Chemical resistant apron.

General Hygiene Measures

Wash contaminated clothing before reuse. Wash thoroughly after handling.

Section 9 - Physical/Chemical Properties

Appearance	Physical State	Color
	Clear liquid	Colorless
Molecular Weight:	78.13 AMU	
pH	N/A	
BP/BP Range	189 °C	
MP/MP Range	18.4 °C	
Freezing Point	N/A	
Vapor Pressure	0.42 mmHg	20 °C
Vapor Density	2.7 g/l	
Saturated Vapor Conc.	N/A	
SG/Density	1.1 g/cm3	
Bulk Density	N/A	
Odor Threshold	N/A	
Volatile%	N/A	
VOC Content	N/A	
Water Content	< 0.3 %	
Solvent Content	N/A	
Evaporation Rate	N/A	
Viscosity	N/A	
Partition Coefficient	N/A	
Decomposition Temp.	N/A	
Flash Point °F	188.6 °F	Method: closed cup
Flash Point °C	87 °C	Method: closed cup
Explosion Limits	Lower: 3.5 % Upper: 42 %	63 °C
Flammability	N/A	
Autoignition Temp	301 °C	
Refractive Index	1.479	
Solubility	N/A	

N/A = not available

Section 10 - Stability and Reactivity

Stability
Stable
Stable.
Conditions to Avoid
Moisture.
Materials to Avoid
Acid chlorides, Phosphorus halides, Strong acids, Strong oxidizing agents, Strong reducing agents.

Hazardous Decomposition Products

Hazardous Decomposition Products

Carbon monoxide, Carbon dioxide, Sulfur oxides.

Hazardous Exothermic Reactions

Hazardous Exothermic Reactions

Methyl sulfoxide (DMSO) undergoes a violent exothermic reaction on mixing with copper wool and trichloroacetic acid. On mixing with potassium permanganate it will flash instantaneously. It reacts violently with: acid halides, cyanuric chloride, silicon tetrachloride, phosphorus trichloride and trioxide, thionyl chloride, magnesium perchlorate, silver fluoride, methyl bromide, iodine pentafluoride, nitrogen periodate, diborane, sodium hydride, and perchloric and periodic acids. When heated above its boiling point methyl sulfoxide degrades giving off formaldehyde, methyl mercaptan, and sulfur dioxide.

Hazardous Polymerization

Hazardous Polymerization

Will not occur.

Section 11 - Toxicological Information

Route of Exposure

Skin Contact

May cause skin irritation.

Skin Absorption

May be harmful if absorbed through the skin. Readily absorbed through skin.

Eye Contact

May cause eye irritation.

Inhalation

Material may be irritating to mucous membranes and upper respiratory tract. May be harmful if inhaled.

Ingestion

May be harmful if swallowed.

Target Organ(s) or System(s)

Eyes. Skin.

Signs and Symptoms of Exposure

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Conditions Aggravated by Exposure

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.

RTECS Number: PV6210000

Toxicity Data

Oral - Rat: 14500 mg/kg (LD50)

Remarks: Sense Organs and Special Senses (Nose, Eye, Ear, and Taste):Eye:Hemorrhage.

Sense Organs and Special Senses (Nose, Eye, Ear, and Taste):Eye:Conjunctive irritation.

Skin - Rat: 40000 mg/kg (LD50)

Intraperitoneal - Rat: 8200 MG/KG (LD50)

Subcutaneous - Rat: 12 GM/KG (LD50)

Remarks: Behavioral:Change in motor activity (specific assay).

Lungs, Thorax, or Respiration:Dyspnea.

Intravenous - Rat: 5360 MG/KG (LD50)

Remarks: Behavioral:Tremor.

Behavioral:Muscle weakness.

Lungs, Thorax, or Respiration:Dyspnea.

Oral - Mouse: 7920 mg/kg (LD50)

Skin - Mouse: 50000 mg/kg (LD50)

Intraperitoneal - Mouse: 2500 MG/KG (LD50)

Subcutaneous - Mouse: 14 GM/KG (LD50)

Remarks: Behavioral:Change in motor activity (specific assay).

Lungs, Thorax, or Respiration:Other changes.

Kidney, Ureter, Bladder:Hematuria.

Intravenous - Mouse: 3100 MG/KG (LD50)

Remarks: Sense Organs and Special Senses (Nose, Eye, Ear, and Taste): Eye: Hemorrhage.
Sense Organs and Special Senses (Nose, Eye, Ear, and Taste): Eye: Conjunctive Irritation.

Oral - Dog: > 10000 mg/kg (LD50)

Intravenous - Dog: 2500 MG/KG (LD50)

Remarks: Cardiac: Other changes.

Kidney, Ureter, Bladder: Hematuria.

Kidney, Ureter, Bladder: Other changes.

Oral - Chicken: 12000 mg/kg (LD50)

Oral - Mammal: 21400 mg/kg (LD50)

Oral - Bird (wild): 100 mg/kg (LD50)

Irritation Data

Skin - Rabbit: 10 mg 24H

Remarks: Open Irritation test

Skin - Rabbit: 500 mg 24H

Remarks: Mild irritation effect

Eyes - Rabbit: 100 mg

Eyes - Rabbit: 500 mg 24H

Remarks: Mild irritation effect

Chronic Exposure - Carcinogen

Rat - Oral: 59 GM/KG 81W I

Result: Tumorigenic: Equivocal tumorigenic agent by RTECS criteria. Skin and Appendages: Other: Tumors.

Rat - Subcutaneous: 220 GM/KG 82W I

Result: Tumorigenic: Equivocal tumorigenic agent by RTECS criteria. Skin and Appendages: Other: Tumors.

Mouse - Oral: 65340 MG/KG 66W I

Result: Tumorigenic: Equivocal tumorigenic agent by RTECS criteria. Blood: Leukemia Skin and Appendages: Other: Tumors.

Mouse - Subcutaneous: 66 GM/KG 66W I

Result: Tumorigenic: Equivocal tumorigenic agent by RTECS criteria. Lungs, Thorax, or Respiration: Tumors. Skin and Appendages: Other: Tumors.

Chronic Exposure - Teratogen

Species	Dose	Route of Application	Exposure Time
Mouse	210 GM/KG	Intraperitoneal	(6-12D PREG)
Result: Specific Developmental Abnormalities: Central nervous system.			
Specific Developmental Abnormalities: Musculoskeletal system.			
Mouse	5500 MG/KG	Intraperitoneal	(10D PREG)
Result: Effects on Embryo or Fetus: Fetotoxicity (except death, e.g., stunted fetus).			
Specific Developmental Abnormalities: Musculoskeletal system.			
Hamster	11 GM/KG	Oral	(7D PREG)
Result: Specific Developmental Abnormalities: Central nervous system.			
Specific Developmental Abnormalities: Musculoskeletal system.			
Hamster	5500 MG/KG	Intraperitoneal	(8D PREG)
Result: Specific Developmental Abnormalities: Musculoskeletal system.			
Specific Developmental Abnormalities: Central nervous system.			
Specific Developmental Abnormalities: Craniofacial (including nose and tongue).			
Hamster	4400 MG/KG	Intraperitoneal	(8D PREG)
Result: Effects on Embryo or Fetus: Fetal death.			
Specific Developmental Abnormalities: Central nervous system.			
Hamster	2500 MG/KG	Intravenous	(8D PREG)
Result: Specific Developmental Abnormalities: Central nervous system.			
Specific Developmental Abnormalities: Craniofacial (including nose and tongue).			
Specific Developmental Abnormalities: Musculoskeletal system.			
Hamster	2500 MG/KG	Intravenous	(8D PREG)
Result: Specific Developmental Abnormalities: Other developmental abnormalities.			

Chronic Exposure - Mutagen

Species	Dose	Route of Application	Cell Type	Mutation test
Human	140 MMOL/L		lymphocyte	Other mutation test systems
Rat	25 GM/KG	Intraperitoneal		Cytogenetic analysis
Mouse	75 MMOL/KG	Intraperitoneal		DNA damage
Mouse	93 GM/L		lymphocyte	Cytogenetic analysis
Mouse	1 MOL/L		lymphocyte	Mutation in mammalian somatic cells.
Hamster	19 PPH		ovary	Cytogenetic analysis
Hamster	1 PPH		lung	Cytogenetic analysis

Chronic Exposure - Reproductive Hazard

Species	Dose	Route of Application	Exposure Time
Rat	56 GM/KG	Intraperitoneal	(6-12D PREG)
Result: Effects on Fertility: Abortion.			
Rat	6600 MG/KG	Intraperitoneal	(7-15D PREG)
Result: Effects on Fertility: Post-implantation mortality (e.g., dead and/or resorbed implants per total number of implants).			
Rat	30750 MG/KG	Subcutaneous	(8-10D PREG)
Result: Effects on Fertility: Post-implantation mortality (e.g., dead and/or resorbed implants per total number of implants).			
Effects on Fertility: Litter size (e.g., # fetuses per litter; measured before birth).			
Mouse	16 MG/KG	Oral	(5-9D PREG)
Result: Effects on Fertility: Pre-implantation mortality (e.g., reduction in number of implants per female; total number of implants per corpora lutea). Effects on Embryo or Fetus: Fetotoxicity (except death, e.g., stunted fetus). Specific			
Developmental Abnormalities: Musculoskeletal system.			
Mouse	8250 MG/KG	Intraperitoneal	(10D PREG)
Result: Effects on Fertility: Post-implantation mortality (e.g., dead and/or resorbed implants per total number of implants).			
Mouse	240 GM/KG	Intravenous	(1-20D PREG)
Result: Effects on Fertility: Post-implantation mortality (e.g., dead and/or resorbed implants per total number of implants).			

Section 12 - Ecological Information

N/A

Acute Ecotoxicity Tests

Test Type

LC50 Fish

Species

Onchorhynchus mykiss (Rainbow trout)

Time:

96.0 h

Value:

35,000 mg/l

Section 13 - Disposal Considerations

Appropriate Method of Disposal of Substance or Preparation

Contact a licensed professional waste disposal service to dispose of this material.

This combustible material may be burned in a chemical incinerator equipped with an afterburner and scrubber.

Observe all federal, state, and local environmental regulations.

Section 14 - Transport Information

DOT

Proper Shipping Name: Combustible liquid, n.o.s.

UN#: NA1993

Class: COMBUSTIBLE LIQUID

Packing Group: Packing Group III

Hazard Label: None

PIH: Not PIH

IATA

Non-Hazardous for Air Transport: Non-hazardous for air transport.

Section 15 - Regulatory Information

US Classification and Label Text

US Statements

Readily absorbed through skin, Target organ(s): Eyes, Skin, Combustible.

United States Regulatory Information

SARA Listed: No

TSCA Inventory Item: Yes

Canada Regulatory Information

WHMIS Classification

This product has been classified in accordance with the hazard criteria of the CPR, and the MSDS contains all the information required by the CPR.

DSL: Yes

NDSL: No

Section 16 - Other Information

Disclaimer

For R&D or manufacturing use. Not for prescription compound or other uses.

Warranty

The above information is believed to be correct 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 Inc., shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale. Copyright 2005 Sigma-Aldrich Co. License granted to make unlimited paper copies for internal use only.