

MATERIAL SAFETY DATA SHEET

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Version 1.11

Section 1 - Product and Company Information

Product Name	DIMETHYL SULFOXIDE
Product Number	D5879
Brand	SIGMA
Company	Sigma-Aldrich
Street Address	3050 Spruce Street
City, State, Zip, Country	SAINT LOUIS MO 63103 US
Technical Phone:	314 771 5765
Emergency Phone:	414 273 3850 Ext. 5996
Fax:	800 325 5052

Section 2 - Composition/Information on Ingredient

Substance Name	CAS #	SARA 313
DIMETHYL SULFOXIDE	67-68-5	No

Formula	C2H6OS
Synonyms	A 10846 * Deltan * Demeso * Demasorb * Demavet * Demsodrox * Dermasorb * Dimethyl sulfoxide * Dimethyl sulphoxide * Dimexide * Dipirartril-tropico * DMS-70 * DMS-90 * DMSO * Dolicur * Domoso * Dromisol * Durasorb * Gamasol 90 * Hyadur * Infiltrina * M 176 * Methane, sulfinylbis- * Methylsulfinylmethane * NSC-763 * Rimso-50 * Somipront * SQ 9453 * Sulfinylbis(methane) * Syntexan * Topsym
RTECS Number:	PV6210000

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

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

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 Method: closed cup

EXPLOSION LIMITS

Lower: 3.5 % Upper: 42 %

AUTOIGNITION TEMP

301 °C

FLAMMABILITY

N/A

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.

ENVIRONMENTAL PRECAUTION(S)

Avoid contaminating sewers and waterways with this material.

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: Store under inert gas. Keep tightly closed. Keep away from heat and open flame. Store in a cool dry place.

SPECIAL REQUIREMENTS

Store under inert gas. 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.

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: Clear liquid Color: Colorless	
Property	Value	At Temperature or Pressure
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/cm ³	
Bulk Density	N/A	
Odor Threshold	N/A	
Volatile%	N/A	
VOC Content	N/A	
Water Content	N/A	
Solvent Content	N/A	
Evaporation Rate	N/A	
Viscosity	0.002 Pas	20 °C
Surface Tension	N/A	
Partition Coefficient	Log Kow: - 2.030	
Decomposition Temp.	> 190 °C	
Flash Point	188.6 °F 87 °C	Method: closed cup
Explosion Limits	Lower: 3.5 % Upper: 42 %	
Flammability	N/A	
Autoignition Temp	301 °C	
Refractive Index	1.479	
Optical Rotation	N/A	
Miscellaneous Data	N/A	
Solubility	Solubility in Water: Miscible.	

N/A = not available

Section 10 - Stability and Reactivity

STABILITY

Stable: Stable.

Conditions to Avoid: Moisture.

Materials to Avoid: Strong acids, Strong oxidizing agents, Strong reducing agents, Phosphorus halides, Acid chlorides.

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

Ingestion: May be harmful if swallowed.

TARGET ORGAN(S) OR SYSTEM(S)

Skin. Eyes.

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.

TOXICITY DATA

Inhalation

Rat

40,250 ppm

LC50

Oral

Rat

3,300 mg/kg

LD50

Skin

Rabbit
> 5,000 mg/kg
LD50

Oral
Rat
14500 mg/kg
LD50

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

Skin
Rat
40000 mg/kg
LD50

Intraperitoneal
Rat
8200 MG/KG
LD50

Subcutaneous
Rat
12 GM/KG
LD50
Remarks: Lungs, Thorax, or Respiration:Dyspnea.
Behavioral:Change in motor activity (specific assay).

Intravenous
Rat
5360 MG/KG
LD50
Remarks: Lungs, Thorax, or Respiration:Dyspnea.
Behavioral:Muscle weakness. Behavioral:Tremor.

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: Kidney, Ureter, Bladder:Hematuria. Lungs, Thorax, or Respiration:Other changes. Behavioral:Change in motor activity (specific assay).

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: Kidney, Ureter, Bladder:Other changes. Cardiac:Other changes. Kidney, Ureter, Bladder:Hematuria.

Oral
Chicken
12000 mg/kg
LD50

Oral
Mammal
21400 mg/kg
LD50

Oral
Bird (wild)
100 mg/kg
LD50

IRRITATION DATA

Skin
Rabbit
4 HOURS
Remarks: No irritation effect
Eyes
Rabbit
Remarks: Mild irritation effect

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

Species: Rat
Route of Application: Oral
Dose: 59 GM/KG
Exposure Time: 81W
Frequency: I
Result: Skin and Appendages: Other: Tumors.
Tumorigenic: Equivocal tumorigenic agent by RTECS criteria.

Species: Rat
Route of Application: Subcutaneous
Dose: 220 GM/KG
Exposure Time: 82W
Frequency: I
Result: Skin and Appendages: Other: Tumors.
Tumorigenic: Equivocal tumorigenic agent by RTECS criteria.

Species: Mouse
Route of Application: Oral
Dose: 65340 MG/KG
Exposure Time: 66W
Frequency: I
Result: Blood: Leukemia Skin and Appendages: Other: Tumors.
Tumorigenic: Equivocal tumorigenic agent by RTECS criteria.

Species: Mouse
Route of Application: Subcutaneous
Dose: 66 GM/KG
Exposure Time: 66W
Frequency: I
Result: Lungs, Thorax, or Respiration: Tumors. Skin and
Appendages: Other: Tumors. Tumorigenic: Equivocal tumorigenic
agent by RTECS criteria.

CHRONIC EXPOSURE - TERATOGEN

Species: Mouse
Dose: 210 GM/KG
Route of Application: Intraperitoneal
Exposure Time: (6-12D PREG)
Result: Specific Developmental Abnormalities: Central nervous
system. Specific Developmental Abnormalities: Musculoskeletal
system.

Species: Mouse
Dose: 5500 MG/KG
Route of Application: Intraperitoneal
Exposure Time: (10D PREG)
Result: Effects on Embryo or Fetus: Fetotoxicity (except death,
e.g., stunted fetus). Specific Developmental Abnormalities:
Musculoskeletal system.

Species: Hamster
Dose: 11 GM/KG
Route of Application: Oral
Exposure Time: (7D PREG)
Result: Specific Developmental Abnormalities: Central nervous
system. Specific Developmental Abnormalities: Musculoskeletal
system.

Species: Hamster
Dose: 5500 MG/KG
Route of Application: Intraperitoneal
Exposure Time: (8D PREG)
Result: Specific Developmental Abnormalities: Musculoskeletal system. Specific Developmental Abnormalities: Central nervous system. Specific Developmental Abnormalities: Craniofacial (including nose and tongue).

Species: Hamster
Dose: 4400 MG/KG
Route of Application: Intraperitoneal
Exposure Time: (8D PREG)
Result: Specific Developmental Abnormalities: Central nervous system. Effects on Embryo or Fetus: Fetal death.

Species: Hamster
Dose: 2500 MG/KG
Route of Application: Intravenous
Exposure Time: (8D PREG)
Result: Specific Developmental Abnormalities: Musculoskeletal system. Specific Developmental Abnormalities: Craniofacial (including nose and tongue). Specific Developmental Abnormalities: Central nervous system.

Species: Hamster
Dose: 2500 MG/KG
Route of Application: Intravenous
Exposure Time: (8D PREG)
Result: Specific Developmental Abnormalities: Other developmental abnormalities.

CHRONIC EXPOSURE - MUTAGEN

Species: Human
Dose: 140 MMOL/L
Cell Type: lymphocyte
Mutation test: Other mutation test systems

Species: Rat
Route: Intraperitoneal
Dose: 25 GM/KG
Exposure Time: 5D
Mutation test: Cytogenetic analysis

Species: Mouse
Route: Intraperitoneal
Dose: 75 MMOL/KG
Mutation test: DNA damage

Species: Mouse
Dose: 93 GM/L
Cell Type: lymphocyte
Mutation test: Cytogenetic analysis

Species: Mouse
Dose: 1 MOL/L
Cell Type: lymphocyte
Mutation test: Mutation in mammalian somatic cells.

Species: Hamster
Dose: 19 PPH

Cell Type: ovary
Mutation test: Cytogenetic analysis

Species: Hamster
Dose: 1 PPH
Cell Type: lung
Mutation test: Cytogenetic analysis

CHRONIC EXPOSURE - REPRODUCTIVE HAZARD

Species: Rat
Dose: 56 GM/KG
Route of Application: Intraperitoneal
Exposure Time: (6-12D PREG)
Result: Effects on Fertility: Abortion.

Species: Rat
Dose: 6600 MG/KG
Route of Application: Intraperitoneal
Exposure Time: (7-15D PREG)
Result: Effects on Fertility: Post-implantation mortality (e.g., dead and/or resorbed implants per total number of implants).

Species: Rat
Dose: 30750 MG/KG
Route of Application: Subcutaneous
Exposure Time: (8-10D PREG)
Result: Effects on Fertility: Litter size (e.g.; # fetuses per litter; measured before birth). Effects on Fertility: Post-implantation mortality (e.g., dead and/or resorbed implants per total number of implants).

Species: Mouse
Dose: 16 MG/KG
Route of Application: Oral
Exposure Time: (5-9D PREG)
Result: Specific Developmental Abnormalities: Musculoskeletal system. Effects on Embryo or Fetus: Fetotoxicity (except death, e.g., stunted fetus). Effects on Fertility: Pre-implantation mortality (e.g., reduction in number of implants per female; total number of implants per corpora lutea).

Species: Mouse
Dose: 8250 MG/KG
Route of Application: Intraperitoneal
Exposure Time: (10D PREG)
Result: Effects on Fertility: Post-implantation mortality (e.g., dead and/or resorbed implants per total number of implants).

Species: Mouse
Dose: 240 GM/KG
Route of Application: Intravenous
Exposure Time: (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

ACUTE ECOTOXICITY TESTS

Test Type: LC50 Fish
Species: Onchorhynchus mykiss (Rainbow trout)

Time: 96 h
Value: 35,000 mg/l

Test Type: EC50 Daphnia
Species: Daphnia pulex
Value: 27,500 mg/l

Test Type: EC50 Algae
Species: Lepomis macrochirus (Bluegill)
Time: 96 h
Value: > 400,000 mg/l

Test Type: LC50 Fish
Species: Pimephales promelas (Fathead minnow)
Time: 96 h
Value: 34,000 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: Combustible. Readily absorbed through skin.
Target organ(s): Eyes. Skin.

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 use only. Not for drug, household 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.