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OCCUPATIONAL HEALTH AND SAFETY
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COMMUNITY

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Web Collections

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SDS
Safety Data Sheets from
manufacturers and suppliers



RTECS®
Registry of Toxic Effects of Chemical
Substances



CHEMINFO
Comprehensive health and safety
information on pure chemicals



OSH References
OSHLINE, NIOSHTIC, NIOSHTIC-2,
HSELINE, CISILO, Canadiana



FDS
Fiches de données de sécurité

Supplements

► Your institution may also have purchased access to some, or all of the following products. If not, you will be prompted for a username and password when you try to view search results.



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HSDB, NJHS Fact Sheets, NIOSH Pocket
Guide, Transport TDG, Transport 49CFR

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safety questions.



CHEMINDEX FREE!
Chemical names, CAS Registry Numbers
and Synonyms



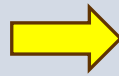
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LANGUAGE

English **1634**
French **851**

PRODUCT NAME

- #790 Sure Universal Gear Lubricant (S ... **1**
- #880 Crown & Chassis Grease (NLGI #00 ... **1**
- #880 Crown & Chassis Grease (NLGI #00 ... **1**
- #890 Vari-Purpose Gear Lubricant (SAE ... **2**
- (R,S)-Anabasine **1**
- (±)-Octanoylcarnitine chloride **1**
- .beta.-Hydroxythiofentanyl (hydrochlo ... **1**
- 1,6-Anhydro-β-D-mannopyranose **2**
- 101 Moly Grease **2**
- 101 SPECIAL BEARING COMPOUND **1**

Show more

MANUFACTURER/SUPPLIER

Search Results

Showing 1 - 10 of 2485

Per page

	Product Name	Manufacturer/Supplier	Language
	Dimethyl Sulfoxide (DMSO)	VALHOMA CORP	English
	MVS DMSO QualAssure™ C, D and E and MVS DMSO Range C, D and E Sample Solutions	ARTEL INC	English
	MVS DMSO QualAssure™ C, D and E and MVS DMSO Range C, D and E Sample	ARTEL INC	French
	Dimethyl Sulfoxide (DMSO)	LIFE TECHNOLOGIES THERMO FISHER SCIENTIFIC / PIERCE BIOTECHNOLOGY	English
	Dimethyl Sulfoxide (DMSO)	LIFE TECHNOLOGIES THERMO FISHER SCIENTIFIC / PIERCE BIOTECHNOLOGY	French
	Sullair AWF	D-A LUBRICANT CO INC	English
	Sullair AWF	D-A LUBRICANT CO INC	French
	CRYOPUR	ORIGEN BIOMEDICAL	English

Safety Data Sheets (SDS) Search for DMSO



DMSO



Using the acronym as the search term may retrieve records where DMSO is mentioned but is not the “main substance” for a record (is not in the Substance Identification field).

LANGUAGE

English 529
French 1

CHEMICAL NAME

Search...

Heavy paraffinic oil (non-specific name) 6
 Heavy paraffinic petroleum distillate ... 6
 Lubricant oil (non-specific name) 6
 Mineral oil (non-specific name) 6
 DMSO 5
 TCA 4
 DIMETHYL SULPHOXIDE 3
 Dimethylsulphoxide 3
 Diméthylsulfoxyde 3
 Methyl sulfoxide 3
 Show more

CAS REGISTRY NUMBER

Search...

67-68-5 6
 64741-88-4 3
 NO CAS RN 3
 1162-65-8 2
 1165-39-5 2
 120-82-1 2
 189-55-9 2
 205-99-2 2
 53-70-3 2
 56-55-3 2
 Show more

SEARCH RESULTS

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DMSO x

Per page

Chemical Name	CAS Registry Number	Database
DIMETHYL SULFOXIDE	67-68-5	HSDB
Methane, sulfinylbis-	67-68-5	DSL/NDSL
Diméthylsulfoxyde	67-68-5	LI/EDS
DIMETHYL SULPHOXIDE	67-68-5	ICSC
DIMETHYL SULFOXIDE	67-68-5	CHRIS
O,O-DIETHYL PHOSPHORODITHIOATE	298-06-6	HSDB
1,6-Dinitropyrene	42397-64-8	HSDB
N-Nitrosodiphenylamine	86-30-6	CESARS
2,4,6-TRIBROMOANILINE	147-82-0	HSDB

DATABASE

HSDB 429
 CESARS 75
 CHEMINFO 20
 ICSC 3
 CHRIS 1
 DSL/NDSL 1
 LI/EDS 1

CHEMPendium Search Results for DMSO

CHEMpendium Search Using CAS Registry Number for a Substance is a More Precise Way to Search

Français Logout

CHEMpendium™

67-68-5

LANGUAGE -

English 5
French 1

CHEMICAL NAME -

Search...

DMSO 5
DIMETHYL SULPHOXIDE 3
Dimethylsulphoxide 3
Diméthylsulfoxyde 3
Methyl sulfoxide 3
Sulfinylbismethane 3
A 10846 2
Al3-26477 2
CASWELL NO. 381 2
CCRIS 943 2
Show more

SEARCH RESULTS

Showing All 6 67-68-5 x CAS Registry Number x 67-68-5 x Clear All Per page 10

Chemical Name	CAS Registry Number	Database
Methane, sulfinylbis-	67-68-5	DSL/NDSL
Diméthylsulfoxyde	67-68-5	LI/EDS
DIMETHYL SULFOXIDE	67-68-5	CHRIS
DIMETHYL SULPHOXIDE	67-68-5	ICSC
DIMETHYL SULFOXIDE	67-68-5	HSDB
Dimethyl sulfoxide	67-68-5	CHEMINFO

Previous 1 Next

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

Canadian Centre for Occupational Health and Safety

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

Record Type: Domestic Substances List / Non-Confidential
CAS Registry Number: 67-68-5
DSL/NDSL Record Number: 1795

Substance Name:
Methane, sulfinylbis-

Synonym(s):
A 10846
A13-26477
CASWELL NO. 381
CCRIS 943
DELTAN
DEMASORB
DEMAVET
DEMESO
DEMSODROX
DERMASORB
DIMEHTYLSULFOXYDE
DIMETHYL SULPHOXIDE
DIMETHYL SULFOXIDE
DIMETHYL SULFOXIDUM
Dimethylsulfoxide
Dimethylsulphoxide
DIMETIL SULFOXIDO
DIMETILSOLFOSSIDO (DCIT)
DIMEXIDE
Diméthylsulfoxyde
DIPIRARTRIL-TROPICO
DMS-70
DMS-90
DMSO
DOLICUR
DOLIGUR
Domofo
DROMISOL
DURASORB
EINECS 200-664-3
GAMASOL 90
HERPID

HYADUR
INFILTRINA
Kemsol
M 176
Methyl sulfoxide
METHYLSULFINYLMETHANE
NSC-763
RIMSO-5
RIMSO-50
SOMIPRONT
SQ 9453
SULFINYLBIS(METHANE)
Sulfinylbismethane
Sulfoxide
SYNTEXAN
TOPSYM
UNII-YOW8V9698H
USEPA/OPP Pesticide Code: 000177

Molecular Formula:
C₂H₆O_S

DISCLAIMER

This database is prepared only as a guide and has no legal authority. Refer to the Canadian Environmental Protection Act (CEPA) and its regulations as the final authority.

This database contains amendments, additions, and deletions published in the *Canada Gazette* up to and including **March 17, 2021**.

CHRIS: Chemical Hazards Response Information System – Excerpts from Record on DMSO

Canadian Centre for Occupational Health and Safety

CHRIS Chemical Hazards Response Information System

Data source: US Coast Guard

OVERVIEW

Record Number 470
CHRIS Code DMS
Chemical Name DIMETHYL SULFOXIDE

Synonym(s)
Methyl Sulfoxide
DMSO

CAS Registry No	67-68-5
Coast Guard Compatibility Class	Not listed.
IMO/UN Designation	Not listed
DOT ID Number	Not listed
NAERG Guide No.	Not listed
Chemical Formula	CH ₃ SOCH ₃
Standard Industry Trade Classification	51549

Characteristics
Liquid Colorless Mild garlic odor Sinks and mixes with water.

Emergency Actions
Call fire department.
Avoid inhalation.
Avoid contact with liquid.
Notify local health and pollution control agencies.
Protect water intakes.

Fire Hazard/Response
Combustible.
POISONOUS GASES MAY BE PRODUCED IN FIRE.
Wear goggles, self-contained breathing apparatus, and rubber overclothing (including gloves).
Extinguish with water, dry chemical, alcohol foam, or carbon dioxide.

Exposure Hazard/Response

CALL FOR MEDICAL AID.

LIQUID
Irritating to skin and eyes.
Flush affected areas with plenty of water.
IF IN EYES, hold eyelids open and flush with plenty of water.

Water Pollution Hazard/Response

Dangerous to aquatic life in high concentrations.
May be dangerous if it enters water intakes.
Notify local health and wildlife officials.
Notify operators of nearby water intakes.

CORRECTIVE RESPONSE ACTIONS

Dilute and disperse
Stop discharge
Do not burn

WATER POLLUTION

Food Chain Concentration Potential	None
Aquatic Toxicity	33,500 ppm/48 hr/bluegill/TLm/fresh water
Waterfowl Toxicity	Currently not available
Biological Oxygen Demand (BOD)	Currently not available

END OF RECORD

The current database reflects the contents of the CHRIS Manual last published by the U.S. Coast Guard in **June, 1999**.



DIMETHYL SULPHOXIDE		ICSC: 0459 Peer-Review Status: 10.04.2000 Validated	
Methyl sulphoxide DMSO			
CAS #: 67-68-5 RTECS #: PV6210000 EINECS #: 200-664-3		Formula: C ₂ H ₆ OS / (CH ₃) ₂ SO Molecular mass: 78.1	
TYPES OF HAZARD / EXPOSURE	ACUTE HAZARDS / SYMPTOMS	PREVENTION	FIRST AID / FIRE FIGHTING
FIRE	Combustible. Gives off irritating or toxic fumes (or gases) in a fire.	NO open flames.	Use water spray, foam, powder, carbon dioxide.
EXPLOSION	Above 87Å°C explosive vapour/air mixtures may be formed.	Above 87Å°C use a closed system, ventilation and explosion-proof electrical equipment.	In case of fire: keep drums, etc., cool by spraying with water.
EXPOSURE		PREVENT GENERATION OF MISTS! STRICT HYGIENE!	
Inhalation	Headache. Nausea.	Use ventilation, local exhaust or breathing protection.	Fresh air, rest.
Skin	MAY BE ABSORBED! Dry skin.	Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap. Refer for medical attention.
Eyes	Redness. Blurred vision.	Wear safety spectacles.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then refer for medical attention.
Ingestion	Nausea. Vomiting. Drowsiness.	Do not eat, drink, or smoke during work.	Do NOT induce vomiting. Refer for medical attention.
SPILLAGE DISPOSAL		PACKAGING & LABELLING	
Personal protection: chemical protection suit and filter respirator for organic gases and vapours adapted to the airborne concentration of the substance. Ventilation. Collect leaking and spilled liquid in sealable containers as far as possible. Absorb remaining liquid in sand or inert absorbent. Then store and dispose of according to local regulations.		EC Classification UN Classification GHS Classification	
EMERGENCY RESPONSE		SAFE STORAGE	
NFPA Code: H1, F1, R0.		Separated from strong oxidants. Cool. Keep in the dark. Keep in a well-ventilated room.	
IMPORTANT DATA			
Physical State; Appearance COLOURLESS HYGROSCOPIC LIQUID. Physical dangers The vapour is heavier than air and may travel along the ground; distant ignition possible. Chemical dangers Decomposes on heating and on burning. This produces toxic fumes including sulfur oxides. Reacts violently with strong oxidants such as perchlorates. Occupational exposure limits TLV (NOT-ESTABLISHED): MAK: 50 ppm, 160 mg/mÅ³; Peak limitation category: I(2); Pregnancy risk group: D; Skin absorption (H), (DFG 2008).		Routes of exposure The substance can be absorbed into the body by inhalation, through the skin and by ingestion. Inhalation risk No indication can be given about the rate at which a harmful concentration of this substance in the air is reached on evaporation at 20Å°C. Effects of short-term exposure The substance is irritating to the eyes and skin. Exposure to high concentrations could cause lowering of consciousness. May accelerate skin absorption of other materials. See Notes. Effects of long-term or repeated exposure Repeated or prolonged contact with skin may cause dermatitis. The substance may have effects on the liver and blood. This may result in impaired functions and lesions of blood cells.	
PHYSICAL PROPERTIES		ENVIRONMENTAL DATA	
Boiling point: 189Å°C Melting point: 18.5Å°C Relative density (water = 1): 1.1 Solubility in water: miscible Vapour pressure, Pa at 20Å°C: 59.4 Relative vapour density (air = 1): 2.7 Flash point: 87Å°C c.c. Auto-ignition temperature: 215Å°C Explosive limits, vol% in air: 2.6-42.0 Octanol/water partition coefficient as log Pow: -1.35 (calculated)			
NOTES			
Special attention needed when toxic materials present in Dimethyl sulphoxide because of enhanced skin absorption. Card has been partly updated in October 2005. See section Occupational Exposure Limits.			

CHEMPendium Search Results – HSDB and CESARS

Canadian Centre for Occupational Health and Safety

HSDB[®] Hazardous Substances Data Bank[®]

Data source: US National Library of Medicine

Canadian Centre for Occupational Health and Safety

CESARS Chemical Evaluation Search and Retrieval System

Data source: Michigan Department of Environmental Quality and Ontario Ministry of the Environment

Record Contents

Format:

- [Substance Identification](#)
- [Description and Warning Properties](#)
- [Safety Hazards and Protection](#)
- [Fire and Reactivity](#)
- [Protective Equipment and Controls](#)
- [Shipment, Storage, Cleanup and Disposal](#)
- [Health Hazards and Toxic Effects](#)
- [Emergency Treatment](#)
- [Metabolism and Pharmacology](#)
- [Pharmacology](#)
- [Environmental Fate and Exposure Potential](#)
- [Sources and Concentrations](#)
- [Human Environmental Exposure](#)
- [Standards and Regulations](#)
- [Monitoring and Analysis Methods](#)
- [Manufacturing and Use Information](#)
- [Chemical and Physical Properties](#)
- [References](#)

Record Contents

Format:


- [Properties](#)
- [Manufacture](#)
- [Acute Toxicity - Terrestrial Animals](#)
- [Acute Toxicity - Humans](#)
- [Acute Toxicity - Aquatic Animals](#)
- [Chronic Toxicity - Terrestrial Animals](#)
- [Chronic Toxicity - Humans](#)
- [Chronic Toxicity - Aquatic Animals](#)
- [Phytotoxicity](#)
- [Carcinogenicity](#)
- [Mutagenicity](#)
- [Reproductive and Developmental Effects](#)
- [Other Adverse Effects](#)
- [Pharmacokinetics/Metabolism](#)
- [Bioaccumulation/Bioconcentration](#)
- [Transport Process](#)
- [General Fate Process](#)
- [Transformation Processes](#)
- [Analysis and Treatment](#)
- [References](#)
- [Topic Area Summaries](#)

DMSO is not in CESARS so this example is the record contents for **Dimethyl Disulfide** (CAS RN: 624-92-0)

Note: CESARS includes toxicity information for plants, animals, and humans

RTECS – Registry of Toxic Effects of Chemical Substances – Categories of Information Available for Methyl Sulfoxide

Canadian Centre for Occupational Health and Safety

 **RTECS** Registry of Toxic Effects of Chemical Substances®
Data Source: BIOVIA

Record Contents

Format:

- [Chemical Identification](#)
- [Skin/Eye Irritation Data](#)
- [Acute Toxicity Data](#)
- [Other Multiple Dose Toxicity Data](#)
- [Tumorigenic Data](#)
- [Reproductive Data](#)
- [Mutation Data](#)
- [Reviews](#)
- [Occupational Exposure Limits](#)
- [NIOSH Standards Development and Surveillance Data](#)
- [Status in U.S.](#)

REFRESH RECORD

DMSO was not in RTECS.
This record outline is for
Methyl Sulfoxide.

RTECS Profile for Methyl Sulfoxide > Chemical Identification, Health Hazard > Skin/Eye Irritation Data

CHEMICAL IDENTIFICATION

RTECS Number PV6210000
Chemical Name Methyl sulfoxide
CAS Registry Number 67-68-5
Last Updated 202009
Data Items Cited 184
Molecular Formula C2-H6-O-S
Molecular Weight 78.14
Wiswesser Line Notation OS1&1
Compound Descriptor Tumorigen
 Drug
 Mutagen
 Reproductive Effector
 Human
 Primary Irritant

Synonyms/Trade Names

- * A 10846
- * DMS-70
- * DMS-90
- * DMSO
- * Deltan
- * Demasorb
- * Demavet
- * Demeso
- * Demsodrox
- * Dermasorb
- * Dimethyl sulfoxide
- * Dimethyl sulphoxide
- * Dimexide
- * Dipirartril-tropico
- * Dollicur
- * Domo
- * Dromisol
- * Durasorb
- * Gamasol 90
- * Hyadur
- * Infiltrina
- * M 176
- * Methane, sulfinylbis-

HEALTH HAZARD DATA

SKIN/EYE IRRITATION DATA

Type of Test	Route of Exposure or Administration	Species/Test System	Dose Data	Reaction Severity	Reference
Open irritation test	Administration onto the skin	Rodent - rabbit	10 mg/24H	Mild	AIHAAP American Industrial Hygiene Association Journal. (AIHA, 475 Wolf Ledges Pkwy., Akron, OH 44311) V.19- 1958- Volume(issue)/page/year: 23,95,1962
Standard Draize test	Administration onto the skin	Rodent - rabbit	500 mg/24H	Mild	85JCAE "Prehled Prumyslove Toxikologie; Organicke Latky," Marhold, J., Prague, Czechoslovakia, Avicenum, 1986 Volume(issue)/page/year: -,1044,1986
Standard Draize test	Administration into the eye	Rodent - rabbit	100 mg		TXAPA9 Toxicology and Applied Pharmacology. (Academic Press, Inc., 1 E. First St., Duluth, MN 55802) V.1- 1959- Volume(issue)/page/year: 39,129,1977
Standard Draize test	Administration into the eye	Rodent - rabbit	500 mg/24H	Mild	85JCAE "Prehled Prumyslove Toxikologie; Organicke Latky," Marhold, J., Prague, Czechoslovakia, Avicenum, 1986 Volume(issue)/page/year: -,1044,1986
Standard Draize test	Administration onto the skin	Rodent - rabbit	100 mg	Mild	ENTOX* Encyclopedia of Toxicology: Reference Book, Elsevier, 2005 Volume(issue)/page/year: 51,-,2005
Standard Draize test	Administration into the eye	Rodent - rabbit	100 mg	Mild	ENTOX* Encyclopedia of Toxicology: Reference Book, Elsevier, 2005 Volume(issue)/page/year: 51,-,2005
Standard Draize test	Administration into the eye	Rodent - rabbit	0.1 mL	Mild	HPV212 U.S. Environmental Protection Agency; High Production Volume (HPV) Challenge; Dimethyl sulfoxide.pdf http://www.epa.gov/HPV/pubs/summaries/dimthslf/c14721tc.htm Volume(issue)/page/year: -, -,2003

SEARCH RESULTS

MARK

Showing 1 - 10 of 20 DMSO ×

Chemical Name	CAS Registry Number
Dimethyl sulfoxide 	67-68-5
4-tert-Butylbenzoic acid	98-73-7
Dibenzo(a,i)pyrene	189-55-9
Benzo(b)fluoranthene	205-99-2
Dibenz(a,h)anthracene	53-70-3
Benz(a)anthracene	56-55-3
Trichloroacetic acid solid	76-03-9
Trichloroacetic acid solutions	76-03-9

CHEMINFO
Search Results
for DMSO

Record Contents

Format: All Sections ▾

- [Chemical Identification](#)
- [Description](#)
- [Hazards Identification](#)
 - [Emergency Overview](#)
 - [Potential Health Effects](#)
- [First Aid Measures](#)
- [Fire Fighting Measures](#)
- [Accidental Release Measures](#)
- [Handling and Storage](#)
- [Exposure Controls/Personal Protection](#)
 - [Exposure Guidelines](#)
- [Physical and Chemical Properties](#)
- [Stability and Reactivity](#)
- [Toxicological Information](#)
- [Ecological Information](#)
- [Disposal Considerations](#)
- [Transport Information](#)
- [Regulatory Information](#)
 - [Canadian Workplace Hazardous Materials Information System \(WHMIS\)](#)
- [Other Information](#)

CHEMINFO
Profiles are
Created by CCOHS

Profile for DMSO

CHEMINFO Profile for DMSO > Chemical Identification & Description

SECTION 1. CHEMICAL IDENTIFICATION

CHEMINFO Record Number: 793

CCOHS Chemical Name: Dimethyl sulfoxide

Synonyms:

Dimethylsulphoxide
Dimethyl sulphoxide
DMSO
Methyl sulfoxide
Sulfinylbismethane
Diméthylsulfoxyde

Chemical Name French: Sulfoxyde de diméthyle

Chemical Name Spanish: Dimetil sulfoxido

CAS Registry Number: 67-68-5

Molecular Formula: C₂H₆O-S

Status of Record:

The CHEMINFO record for this chemical is complete. The full format provides a detailed evaluation of health, fire and reactivity hazards, as well as recommendations on topics such as handling and storage, personal protective equipment, accidental release and first aid.

SECTION 2. DESCRIPTION

Appearance and Odour:

Clear, colourless, odourless liquid.(15,56) Commercial grades have a strong sulfur odour.(13) Strongly hygroscopic (absorbs moisture from the air).(15,56)

Odour Threshold:

Not available

Warning Properties:

Information not available for evaluation.

Composition/Purity:

Dimethyl sulfoxide is available commercially in 99.9% plus purity. The main impurity is water.(58) It has an equilibrium moisture content of 10% with air at 20 deg C.(57)

Uses and Occurrences:

Dimethyl sulfoxide is widely used as a solvent for polymerization and spinning, and other polymerization reactions; for chemical extractions; in chemical analysis and polarographic studies; for cellulose, cellulose esters and cellulose ethers, and many metal salts; for clean-up; for industrial cleaners and hydraulic fluids; and as a reaction medium for chemical and electrolytic reactions.(56,58,59)

Dimethyl sulfoxide is also used as a pharmaceutical and is used in veterinary medicine, and plant pathology.(14,56,58,59) It was formerly used as a vehicle for the dermal administration of drugs.(14)

Dimethyl sulfoxide occurs naturally in spearmint oil, grains, vegetables, beverages, beer, coffee, milk, and tea. It is a common constituent of ground water, seawater, and rainwater.(58)

CHEMINFO Profile for DMSO > Hazard Identification > Potential Health Effects

SECTION 3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW:

Clear, colourless, odourless liquid. Commercial grades have a strong sulfur odour. Strongly hygroscopic. COMBUSTIBLE LIQUID AND VAPOUR. Can decompose at high temperatures forming toxic gases, such as sulfur oxides, organic sulfides, methanethiol, and formaldehyde. Essentially non-toxic following short-term exposure. Significantly enhances the absorption of numerous chemicals and drugs. Increased absorption could lead to increased toxicity.

POTENTIAL HEALTH EFFECTS

Effects of Short-Term (Acute) Exposure

Inhalation:

Dimethyl sulfoxide does not readily form a vapour at room temperature. Therefore, inhalation exposure is unlikely to occur unless it is heated or misted. No human information about the potential harmful effects of inhaled dimethyl sulfoxide was located. The limited animal information available suggests that it is not very harmful by this route of exposure.

Skin Contact:

Dimethyl sulfoxide is a very mild skin irritant, based on animal and limited human information. However, concentrated dimethyl sulfoxide has produced warmth, wheals and flaring (contact urticaria).(1,2,3,4) In a study with 200 volunteers, application of 100% dimethyl sulfoxide provoked definite wheal formation on the forearm, while 90% for 5 minutes did not produce any response in most volunteers.(2) In another study, whealing and flaring were observed following application of 70% dimethyl sulfoxide or greater for 5 minutes. In the same study, prominent whealing was observed following the application of 90% dimethyl sulfoxide for 10 or 60 minutes.(1) Similar results have been obtained in other studies.(3,4) There may be individual susceptibility to wheal formation since people have developed wheals following exposure to concentrations as low as 20%.(3) Skin absorption may result in a garlic-like breath odour and central nervous system effects such as headache, nausea and dizziness.(4,5)

Eye Contact:

Dimethyl sulfoxide is either not irritating or a very mild eye irritant, based on human and animal information. Application of 2 drops of 50-100% has caused a temporary burning sensation or stinging in volunteers. Concentrations of less than 50% produced no effects.(6) No to mild irritation has been observed in several animal studies.

Ingestion:

Animal toxicity information indicates that the oral toxicity of dimethyl sulfoxide is low. Oral administration is not approved therapeutically for humans, but is occasionally used. Gastrointestinal discomfort is the most common side effect reported.(7) Central nervous system (CNS) effects such as headache, nausea, vomiting and dizziness may be experienced if large doses are ingested. Ingestion is not a common route of occupational exposure.

CHEMINFO Profile for DMSO > Hazard Identification > Effects of Long-Term (Chronic) Exposure

Effects of Long-Term (Chronic) Exposure

Nervous System:

Long-term non-occupational skin application of 80-90% dimethyl sulfoxide has produced central nervous system effects (such as fatigue, nausea, vomiting, sedation, dizziness, and headaches).(5) These effects were also noted following short-term exposures and the authors did not differentiate between the long-term and short-term effects.

Skin:

Repeated or prolonged skin contact has resulted in dermatitis (red, dry, scaly skin) in people treated with dimethyl sulfoxide therapeutically.(4,8) Animal studies also indicate that dimethyl sulfoxide produces severe dermatitis at the site of application.

Dimethyl sulfoxide has also produced warmth, wheals and flaring (contact urticaria) following repeated exposure. This is a temporary reaction, which generally disappears shortly after exposure stops.(80)

Skin Sensitization:

Dimethyl sulfoxide is not a skin sensitizer.

Skin sensitization was not reported in hundreds of volunteers participating in a dimethyl sulfoxide clinical trial. Also in this study, sensitizing capacity was evaluated by applying 90% dimethyl sulfoxide to 25 volunteers using five 48-hour occlusive patches to sites previously inflamed by 10% sodium lauryl sulfate. None of the volunteers showed contact allergy when challenged with 50% dimethyl sulfoxide 2 weeks later.(6) Negative results were also obtained in a maximization test using 23 volunteers.(51) Negative results were also obtained in several animal studies.

Eyes/Vision:

Several sources indicate that research has shown no effects on the eyes or vision in humans following skin application of dimethyl sulfoxide. (9,10,11,12,13,14)

Carcinogenicity:

Dimethyl sulfoxide is not known to be a carcinogen. No human information was located. No conclusions can be drawn based on the limited animal studies available.

Dimethyl sulfoxide may significantly increase the skin absorption of known carcinogens.(15)

The International Agency for Research on Cancer (IARC) has not evaluated the carcinogenicity of this chemical.

The American Conference of Governmental Industrial Hygienists (ACGIH) has no listing for this chemical.

The US National Toxicology Program (NTP) has not listed this chemical in its report on carcinogens.

Teratogenicity and Embryotoxicity:

Dimethyl sulfoxide is not known to cause developmental toxicity. No human information was located. Embryotoxicity or fetotoxicity has been seen in rats and mice exposed orally to doses which also cause maternal toxicity. Other animal studies cannot be evaluated due to poor reporting and/or study design or have not reported teratogenic, embryotoxic, or fetotoxic effects.

Reproductive Toxicity:

Dimethyl sulfoxide is not known to be a reproductive hazard. No human information was located. The limited animal information located has not shown reproductive effects.

Mutagenicity:

Dimethyl sulfoxide is not known to be mutagenic. No human information was located. No studies in live animals using a relevant route of exposure were located. Dimethyl sulfoxide has given mostly negative results in tests using cultured mammalian cells, bacteria, yeast, and fruit flies (*Drosophila*). It is widely used as a solvent for other chemicals in mutagenicity tests.

CHEMINFO Profile for DMSO > Hazard Identification > Effects of Long-Term (Chronic) Exposure AND First Aid Measures

Toxicologically Synergistic Materials:

Dimethyl sulfoxide has significantly enhanced the absorption of numerous chemicals and drugs in humans, rats, mice, and guinea pigs. Increased absorption could lead to increased toxicity.(1,10,11,19-22) The ability of dimethyl sulfoxide to increase the absorption of other chemicals is its most significant occupational hazard. In animal studies, dimethyl sulfoxide has been shown to protect the liver and kidneys from the injury produced by some drugs and chemicals.

Potential for Accumulation:

Dimethyl sulfoxide is very readily absorbed through the skin and other membranes and is rapidly absorbed into the blood and transported throughout the body. It is metabolized to the volatile dimethyl sulfide, which has a characteristic garlic-like odour, or to dimethyl sulfone. Unchanged dimethyl sulfoxide is primarily excreted in the urine together with dimethyl sulfone, while some unchanged dimethyl sulfoxide and the volatile dimethyl sulfide are exhaled in the breath.(13,14,15)

SECTION 4. FIRST AID MEASURES

Inhalation:

If symptoms are experienced, remove source of contamination or move victim to fresh air and obtain medical attention.

Skin Contact:

Avoid direct contact. Wear chemical protective clothing, if necessary. As quickly as possible, flush with lukewarm, gently flowing water for at least 5 minutes or until the chemical is removed. Obtain medical advice. Completely decontaminate clothing, shoes and leather goods before re-use or discard.

Eye Contact:

Avoid direct contact. Wear chemical protective gloves, if necessary. Immediately flush the contaminated eye(s) with lukewarm, gently flowing water for 5 minutes or until the chemical is removed, while holding the eyelid(s) open. Obtain medical advice.

Ingestion:

If irritation or discomfort occur, obtain medical advice immediately.

First Aid Comments:

Consult a doctor and/or the nearest Poison Control Centre for all exposures except minor instances of inhalation or skin contact. All first aid procedures should be periodically reviewed by a doctor familiar with the material and its conditions of use in the workplace.

Note to Physicians:

DMSO can significantly enhance the absorption of many other chemicals and drugs.

CHEMINFO Profile for DMSO > Firefighting Measures

SECTION 5. FIRE FIGHTING MEASURES

Flash Point:

87 deg C (188.6 deg F) (closed cup) (69)

Lower Flammable (Explosive) Limit (LFL/LEL):

2.6% (60,61)

Upper Flammable (Explosive) Limit (UFL/UEL):

28.5% (62); 42% (60,61)

Autoignition (Ignition) Temperature:

215 deg C (419 deg F) (61,62); also reported as 300-302 deg C (572-575.6 deg F) (58)

Sensitivity to Mechanical Impact:

Probably not sensitive. Stable compound.

Electrical Conductivity:

3 x 10(6) pS/m at 20 deg C (58); 2 x 10(5) pS/m at 25 deg C (57,73)

Flammable Properties:

Combustible liquid. Can form explosive mixtures with air at, or above, 87 deg C. Will not accumulate static charge, since the electrical conductivity is high.(58,57,73)

Specific Hazards Arising from the Chemical:

Carbon monoxide, carbon dioxide, sulfur oxides, and other toxic and irritating gases and vapours may be formed in a fire. Decomposes slowly at, or above, 189 deg C forming methanethiol, formaldehyde, water, bis(methylthio)methane, dimethyl disulfide, dimethyl sulfone, dimethyl sulfide, and other chemicals.(58) Pure dimethyl sulfoxide may decompose violently at 270-355 deg C.(66) Closed containers may rupture violently or explode and suddenly release large amounts of product when exposed to fire or excessive heat for a sufficient period of time.

Suitable Extinguishing Media:

Carbon dioxide, dry chemical powder, appropriate foam, water spray or fog. "Multipurpose " alcohol-resistant foams are recommended for use on water soluble combustible polar liquids, like dimethyl sulfoxide.(61) Foam manufacturers should be consulted for recommendations regarding types of foams and application rates.

Special Protective Precautions for Firefighters:

Evacuate area and fight fire from a safe distance or protected location. Approach fire from upwind to avoid hazardous and toxic decomposition products, such as sulfur oxides. Wear full protective suit if exposure is possible. See Protection of Firefighters.

If possible, isolate materials not yet involved in the fire, and move containers from the fire area if this can be done without risk, and protect personnel. Closed containers may rupture violently when exposed to the heat of a fire. Therefore, fire-exposed containers, tanks or equipment should be cooled by application of hose streams. Application should begin as soon as possible (within the first several minutes) and should concentrate on any unwetted portions of the container. Apply water from the side and from a safe distance until well after the fire is out. Stay away from ends of tanks, involved in the fire, but be aware that flying material from ruptured tanks may travel in any direction. Withdraw immediately in case of rising sound from venting safety device or any discolouration of tank due to fire. Cooling should continue until well after the fire is out. If this is not possible, use unmanned monitor nozzles and immediately evacuate the area.

If a leak or spill has not ignited, use water spray in large quantities to disperse the vapours and to protect personnel attempting to stop a leak. Water spray can be used to flush spills away from ignition sources and to dilute spills to non-flammable mixtures. Dike fire control water for appropriate disposal. Solid streams of water may be ineffective and spread material.

For an advanced or massive fire in a large area, use unmanned hose holder or monitor nozzles; if this is not possible withdraw from fire area and allow fire to burn.

Tanks, drums or other containers should not be approached directly after they have been involved in a fire or heated by exposure, until they have been completely cooled down. After the fire has been extinguished, toxic and irritating atmospheres may be present. Before entering such an area, especially confined areas, check the atmosphere with an appropriate monitoring device.

Protection of Fire Fighters:

The decomposition products of dimethyl sulfoxide are hazardous to health. Firefighters may enter the area if positive pressure self-contained breathing apparatus (NIOSH approved or equivalent) and full Bunker Gear is worn.

CHEMINFO Profile for DMSO > NFPA Hazard Identification, Accidental Release Measures, Handling and Storage

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA) HAZARD IDENTIFICATION

NFPA - Health:	2 - Can cause temporary incapacitation or residual injury under emergency conditions.
NFPA - Flammability:	2 - Must be moderately heated or exposed to relatively high ambient temperatures before ignition can occur.
NFPA - Instability:	0 - Normally stable, even under fire conditions.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Spill Precautions:

Restrict access to area until completion of clean-up. Ensure clean-up is conducted by trained personnel only. Wear adequate personal protective equipment. Extinguish or remove all ignition sources.
Notify government occupational and environmental authorities.

Clean-up:

Do not touch spilled material. Prevent material from entering sewers or confined spaces. Stop or reduce leak if safe to do so. Contain spill with earth, sand, or absorbent material which does not react with spilled material.
Remove liquid by pumps or vacuum equipment. Place in suitable, covered, labelled containers.
SMALL SPILLS: Soak up spill with absorbent material which does not react with spilled chemical. Put material in suitable, covered, labelled containers. Flush area with water.
Contaminated absorbent material may pose the same hazards as the spilled product.
LARGE SPILLS: Contact fire and emergency services and supplier for advice.

SECTION 7. HANDLING AND STORAGE

Handling:

This material is a COMBUSTIBLE liquid. Dimethyl sulfoxide significantly enhances the skin absorption of many other chemicals and drugs. Increased absorption could lead to increased toxicity. Before handling, it is very important that engineering controls are operating and that protective equipment requirements and personal hygiene measures are being followed. People working with this chemical should be properly trained regarding its hazards and its safe use.

Maintenance and emergency personnel should be advised of potential hazards. Avoid all ignition sources. Post "NO-SMOKING" signs. It is good practice to keep all areas where this material is handled clear of other materials which can burn (e.g. cardboard, sawdust).

Avoid generating mists. Avoid heating this material. Prevent the release of vapours or mists into the air. Use the smallest possible amounts in a ventilated area, separate from the storage area.

Never perform any welding, cutting, soldering, drilling or other hot work on an empty vessel, containers or piping until all liquid and vapours have been cleared.

Never return contaminated material to its original container. Do not use with incompatible materials such as oxidizing agents and strong bases. See Incompatibilities - Materials to Avoid section for more information.

Inspect containers for damage or leaks before handling. Cautiously, dispense into sturdy containers made of compatible materials. Whenever possible, use self-closing, portable containers for dispensing small amounts of this material. Never transfer liquid by pressurizing original container with air or inert gas.

Label containers. Avoid damaging containers. Keep containers closed when not in use. Follow handling precautions on Material Safety Data Sheet. Have suitable emergency equipment for fires, spills and leaks readily available. Practice good housekeeping. Maintain handling equipment. Comply with applicable regulations.

CHEMINFO Profile for DMSO > Handling and Storage, Exposure Controls/Personal Protection

Storage:

Store in a cool, ventilated area, out of direct sunlight and away from heat and ignition sources. Keep quantities stored as small as possible.

Store away from incompatible materials, such as oxidizing agents and bases. See Incompatibilities - Materials to Avoid section for more information.

Inspect all incoming containers to make sure they are properly labelled and not damaged. Protect the label and keep it visible. Keep containers tightly closed when not in use. Protect from damage.

Keep empty containers in separate storage area. Empty containers may contain hazardous residues. Keep closed.

Storage area should be clearly identified, clear of obstruction and accessible only to trained and authorized personnel. Keep storage area separate from work areas, elevators, building and room exits or main aisles leading to exits. Keep storage area clear of burnable materials (e.g. old rags, cardboard). Lighted cigarettes, matches, or any other ignition sources should not be allowed around indoor or outdoor storage areas. Post warning signs. Inspect periodically for evidence of corrosion or leaks.

Storage facilities should be made of fire-resistant materials. Have appropriate fire extinguishers and spill clean-up equipment in storage area. Contain spills or leaks by storing in trays made from compatible materials. Keep absorbents for leaks and spills readily available. Provide raised sills or ramps at doorways or create a trench which drains to a safe location. Floors should be sealed to prevent absorption.

Storage tanks should be above ground and surrounded with a dike capable of holding entire contents.

Follow any special instructions for storage on Material Safety Data Sheet. Store this material according to applicable occupational health and safety regulations and fire and building codes.

SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

NOTE: Exposure to this material can be controlled in many ways. The measures appropriate for a particular worksite depend on how this material is used and on the extent of exposure. This general information can be used to help develop specific control measures. Ensure that control systems are properly designed and maintained. Comply with occupational, environmental, fire, and other applicable regulations.

Engineering Controls:

Engineering control methods to reduce hazardous exposures are preferred. Methods include mechanical ventilation (dilution and local exhaust), process or personnel enclosure, control of process conditions, and process modification (e.g. substitution of a less hazardous material). Administrative controls and personal protective equipment may also be required.

If dimethyl sulfoxide is heated or misted, use a non-sparking, grounded ventilation system separate from other exhaust ventilation systems. Exhaust directly to the outside.

Supply sufficient replacement air to make up for air removed by exhaust systems.

Personal Protective Equipment:

If engineering controls and work practices are not effective in controlling exposure to this material, then wear suitable personal protective equipment including approved respiratory protection. Have appropriate equipment available for use in emergencies such as spills or fire.

If respiratory protection is required, institute a complete respiratory protection program including selection, fit testing, training, maintenance and inspection. Refer to the CSA Standard Z94.4-11 "Selection, Use and Care of Respirators," available from the Canadian Standards Association.

Respiratory Protection Guidelines:

No specific guidelines are available. Contact chemical manufacturer, supplier or appropriate government agencies for advice.

Eye/Face Protection:

No specific requirement but it is good practice to wear chemical safety goggles.

Skin Protection:

Chemical protective gloves, coveralls, boots, and/or other chemical protective clothing.

CHEMINFO Profile for DMSO > Exposure Controls/Personal Protection

Resistance of Materials for Protective Clothing:

Guidelines for dimethyl sulfoxide (68):

RECOMMENDED (resistance to breakthrough longer than 8 hours): Butyl rubber, Viton(R)/Butyl rubber, Barrier(R) - PE/PA/PE, Silver Shield(R) - PE/EVAL/PE, ChemMAX(R) 4, Interceptor(R), Microchem(R) 4000, Trelchem(R) HPS, Trelchem(R) VPS, Tychem(R) CPF3, Tychem(R) BR/LV, Tychem(R) Responder(R) CSM, Tychem(R) TK, Tychem(R) Reflector.

RECOMMENDED (resistance to breakthrough longer than 4 hours): Neoprene rubber.

CAUTION, use for short periods only (resistance to breakthrough within 1 to 4 hours): Nitrile rubber, Viton(R).

NOT RECOMMENDED for use (resistance to breakthrough less than 1 hour and/or poor degradation rating): Natural rubber, Polyvinyl alcohol (PVAL), Polyvinyl chloride (PVC), Tychem(R) F, Tychem(R) Thermopro.

Recommendations are **NOT** valid for very thin Natural rubber, Neoprene rubber, Nitrile rubber, and PVC gloves (0.3 mm or less). Resistance of specific materials can vary from product to product. Breakthrough times are obtained under conditions of continuous contact, generally at room temperature. Evaluate resistance under conditions of use and maintain clothing carefully.

Personal Hygiene:

Remove contaminated clothing promptly. Discard or launder before rewearing. Inform laundry personnel of contaminant's hazards. Do not eat, drink or smoke in work areas. Wash hands thoroughly after handling this material. Maintain good housekeeping.

EXPOSURE GUIDELINES

THRESHOLD LIMIT VALUES (TLVs®) / AMERICAN CONFERENCE OF GOVERNMENTAL INDUSTRIAL HYGIENISTS (ACGIH®) / 2018

Time-Weighted Average (TLV-TWA): Not established

TLV Comments:

NOTE: In many jurisdictions, exposure limits are similar to the ACGIH TLVs. Since a TLV has not been established for this substance, appropriate government agencies in each jurisdiction should be consulted to determine which regulations apply.

WORKPLACE ENVIRONMENTAL EXPOSURE LEVELS (WEELs®) / AIHA GUIDELINE FOUNDATION/OARS® / 2018

8-Hour Time Weighted Average (WEEL-TWA): 250 ppm

WEEL Comments:

Source: AIHA

PERMISSIBLE EXPOSURE LIMITS (PELs) / US OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA)

Time-Weighted Average (PEL-TWA): Not established

CHEMINFO Profile for DMSO > Physical and Chemical Properties, Stability and Reactivity

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Molecular Weight: 78.13

Conversion Factor:

1 ppm = 3.19 mg/m³; 1 mg/m³ = 0.314 ppm at 25 deg C (calculated)

Physical State: Liquid
Melting Point: 18.5 deg C (65.3 deg F) (56,58)
Boiling Point: 189 deg C (372 deg F) (56,58)
Decomposition Temperature: 270-355 deg C (518-671 deg F) (66)
Relative Density (Specific Gravity): 1.1 at 20 or 25 deg C (water = 1) (57,58,63)
Solubility in Water: Soluble in all proportions.(13,60,74)
Solubility in Other Liquids: Soluble in ethanol, acetone, diethyl ether, benzene, and chloroform.(14,75)
Coefficient of Oil/Water Distribution (Partition Coefficient): Log P(oct) = -1.35 (experimental) (64)
pH Value: Not available
Viscosity-Dynamic: 2.22 mPa.s (2.22 centipoises) at 20 deg C (57); 1.99 mPa.s (1.99 centipoises) at 25 deg C (14,57); also reported as 2.47 mPa.s (2.47 centipoises) at 20 deg C (63,75)
Viscosity-Kinematic: 2.02 or 2.25 mm²/s (2.02 or 2.25 centistokes) at 20 deg C; 1.82 mm²/s (1.82 centistokes) at 25 deg C (calculated)
Vapour Density: 2.69 (air = 1) (calculated)
Vapour Pressure: 0.056 kPa (0.42 mm Hg) at 20 deg C (74); 0.081 kPa (0.61 mm Hg) at 25 deg C (58,74)
Saturated Vapour Concentration: 553 ppm (0.055%) at 20 deg C; 800 ppm (0.08%) at 25 deg C (calculated)
Evaporation Rate: Very low; greater than 300 (diethyl ether = 1) (60)

Other Physical Properties:

47.24 at 20 deg C (63); 46.45 at 25 deg C (57)

SECTION 10. STABILITY AND REACTIVITY

Chemical Stability:

Normally stable.

Possibility of Hazardous Reactions:

None known.

Hazardous Polymerization:

Does not occur

Flammable Gases Released Upon Contact with Water:

None reported.

Conditions to Avoid:

Open flames, temperatures above 87 deg C

Incompatible Materials:

NOTE: Chemical reactions that could result in a hazardous situation (e.g. generation of flammable or toxic chemicals, fire or detonation) are listed here. Many of these reactions can be done safely if specific control measures (e.g. cooling of the reaction) are in place. Although not intended to be complete, an overview of important reactions involving common chemicals is provided to assist in the development of safe work practices.

STRONG OXIDIZING AGENTS (e.g. nitric acid, periodic acid or solid potassium permanganate) - react violently, with risk of fire and explosion.(61,66,67)

STRONG ACIDS (e.g. sulfuric acid) or ACID ANHYDRIDES (e.g. trifluoroacetic anhydride) - violent or explosive reaction.(66)

STRONG BASES such as METAL ALKOXIDES (e.g. potassium tert-butoxide or sodium isopropoxide) or ALKALI METALS (e.g. potassium) - can cause ignition or a violent reaction.(66)

ACYL HALIDES (e.g. acetyl chloride, benzenesulfonyl chloride, benzoyl chloride or cyanuric chloride) or NON-METAL HALIDES (e.g. phosphorus trichloride, phosphoryl chloride, tetrachlorosilane, sulfuryl chloride or thionyl chloride), DINITROGEN

TETRAOXIDE, CARBONYL DIISOCYANATE, HEXACHLOROCYCLOTRIPHOSPHAZINE or SODIUM HYDRIDE - react violently or explosively, with decomposition of dimethyl sulfoxide.(61,66)

METAL OXOSALTS (e.g. aluminum, chromium, magnesium or sodium perchlorates, or iron(III) nitrate), PERCHLORIC ACID (70%), BORON COMPOUNDS (e.g. diborane) or METHYL BROMIDE - react explosively.(61,66)

IODINE PENTAFLUORIDE, SILVER DIFLUORIDE or PHOSPHORUS(III) OXIDE - react violently.(61,66)

COPPER and TRICHLOROACETIC ACID or SULFUR TRIOXIDE - violent exothermic (gives off heat) reaction.(66)

CHEMINFO Profile for DMSO > Stability and Reactivity, Toxicological Information

Hazardous Decomposition Products:

Decomposes slowly above 189 deg C forming methanethiol, formaldehyde, water, bis(methylthio)methane, dimethyl disulfide, dimethyl sulfone, dimethyl sulfide, sulfur dioxide, and other chemicals.(58,62)

Corrosivity to Metals:

No information was located. Probably not corrosive to metals.

Corrosivity to Non-Metals:

Dimethyl sulfoxide attacks plastics, such as polyvinylidene fluoride (Kynar), chlorinated polyvinyl chloride (CPVC), polyvinyl chloride (PVC), nylon 11 and 89, polyurethane (rigid), thermoset polyesters (bisphenol-A-fumarate, isophthalic acid and general purpose), thermoset vinyl ester and thermoset chlorinated polyester (77,78); elastomers, such as Viton A, styrene butadiene (SBR), nylon 11, polyurethane and flexible polyvinyl chloride (PVC) (77,79); and coatings, such as coal tar epoxy, epoxy polyamide, polyester and vinyls (77). Dimethyl sulfoxide does not attack plastics, such as Teflon and other fluorocarbons, like ethylene chlorotrifluoroethylene (Halar), and ethylene tetrafluoroethylene (Tefzel), polypropylene, nylon 6 and 66, high-density polyethylene (HDPE), polyphenylene oxide (Noryl), and polyethylene sulfide (Ryton) (77,78); and elastomers, such as Chemraz, Kalrez, Teflon and low-density polyethylene (LDPE) (77,79)

Stability and Reactivity Comments:

Dimethyl sulfoxide decomposes slowly in water to dimethyl sulfide, which has a strong sulfur odour, and dimethyl sulfone. The reaction is catalyzed by light.(60)

SECTION 11. TOXICOLOGICAL INFORMATION

LC50 (rat): greater than 5330 mg/m³ (vapour/aerosol mixture) (4-hour exposure; no deaths) (80)

LD50 (oral, rat): 14500 mg/kg (23)

LD50 (oral, guinea pig): greater than 11000 mg/kg (cited as greater than 10 mL/kg) (no deaths) (24)

LD50 (oral, mouse): 7920 mg/kg (25, unconfirmed)

LD50 (dermal, rat): approximately 40000 mg/kg has been reported, but is not considered valid. The animals were immersed in dimethyl sulfoxide solutions for a few seconds. The dose was then estimated based on a comparison of the animal weights before and after dipping.(26)

Eye Irritation:

Dimethyl sulfoxide has produced no to very mild irritation.

In an unpublished study conducted according to the OECD Guideline, application of 0.1 mL of undiluted dimethyl sulfoxide produced very mild irritation, which cleared in 3 days (mean scores at 24, 48 and 72 hours: chemosis: 0.33; redness: 1.13; iris: 0; cornea: 0).(80, unconfirmed) Application of 0.5 mL of 100% dimethyl sulfoxide caused very mild injury in rabbits (graded 2/10).(27) Application of 0.1 mL of 100% was mildly irritating in rabbits according to Draize methods.(28) Application of 0.1 mL of 30, 50, 70, and 90% was non-irritating in rabbits according to Draize methods (mean total scores 0, 0.2, 0.2, and 1.6, respectively).(29) Other studies with rabbits have shown similar results.(19,23,80)

CHEMINFO Profile for DMSO > Toxicological Information > Effects of Short-Term Exposure, Effects of Long-Term (Chronic) Exposure

Skin Irritation:

Dimethyl sulfoxide has produced very mild skin irritation.

In a test conducted according to the OECD guideline, application of pure dimethyl sulfoxide for 4 hours caused very mild irritation in rabbits. The mean scores over 24, 48 and 72 hours for each animal were 0.3, 0.0 and 0.7 for erythema and 0.0, 0.0 and 0.0 for edema. The erythema persisted until day 2 for one animal and until day 3 in another one.(80, unconfirmed) Similar results were obtained in a modified Draize test.(81) Application of 0.01 mL of 100% dimethyl sulfoxide produced very mild injury in rabbits (graded 2/10).(27) Application of an unspecified amount of dimethyl sulfoxide using the Draize test produced only slight redness in rabbits, which faded quickly after removal of the taped patch under which the dimethyl sulfoxide had been applied.(23) Whealing and flaring have been observed in guinea pigs following short-term skin contact. Application of 0.05 mL of 60, 80, or 100% to the earlobe of female guinea pigs resulted in immediate (within 5 minutes) redness and swelling. This effect lasted longer than 3 hours. Ear thickness increased after 1-2 hours. This study was designed to evaluate a model for identifying chemicals that cause non-immunologic contact urticaria (whealing and flaring) (NICU). Dimethyl sulfoxide produced a positive result.(20)

Effects of Short-Term (Acute) Exposure:

Inhalation:

No rats died following a 4 hour exposure to air saturated with dimethyl sulfoxide (approximately 500 ppm at 20 deg C or 800 ppm at 25 deg C).(27) In a study limited by poor design and poor reporting, rats were exposed to 1600 mg/m³ for 4 hours, 2900 mg/m³ for 24 hours, or 2000 mg/m³ for 40 hours, probably as an aerosol. All animals survived. The authors reported pulmonary edema in some of the exposed animals.(23)

Skin Contact:

Reduced body weight and minor blood cell changes (e.g. clotting times and platelet count) were observed in rats following skin application. Rats had 0.1 mL of 50 or 100% dimethyl sulfoxide applied for 14 days. The approximate doses were 550 or 1100 mg/kg, respectively.(31)

Ingestion:

Very high oral doses (1100-40000 mg/kg) have produced signs of central nervous system (CNS) depression (reduced activity and incoordination), congestion, and inflammation of the eyes, increased urination, excessive thirst, and deaths in rats.(20,23,32) In one study, male rats were orally administered 1100 mg/kg (cited as 1.0 mL/kg) of 50 or 100% dimethyl sulfoxide. A reduction in spontaneous motor activity was observed 15 minutes after exposure to 1100 mg/kg (cited as 1 mL/kg 100%), which became more pronounced after 45 and 60 minutes. No effect was noted after exposure to 550 mg/kg (cited as 1 mL/kg of 50% dimethyl sulfoxide in water).(20)

Effects of Long-Term (Chronic) Exposure:

Inhalation:

In an unpublished, OECD-compliant study, rats were exposed to 0.31, 0.96 or 2.8 mg/L for 13 weeks (6 hr/d; 7 d/wk) using a snout-only exposure system. At 2.8 mg/L, treatment related changes were observed in the nasal passages and pharynx, indicating respiratory tract irritation. There were no remarkable findings upon examination of the eyes, a functional observation battery, hematology, biochemistry, macroscopic pathology or organ weights.(80, unconfirmed) No significant effects were observed in male rats exposed by inhalation to 62.8 ppm (cited as 200 mg/m³) for 30 days.(23) There are insufficient details available to evaluate another inhalation study in which rabbits developed lung, liver, and renal effects following inhalation of up to 50 mL/hour intermittently for 2 months.(10,15)

Skin Contact:

Several studies with mice, rats, guinea pigs, dogs, and monkeys treated dermally with very high doses (3300-33000 mg/kg for 28 days to 87 weeks) have shown no significant systemic effects. Swelling and ulceration of the skin and dermatitis (dry, red scaly skin) at the site of application were observed in some studies.(11,26,33,34) Eye changes were observed in rabbits exposed to high dermal doses. Rabbits were exposed to up to 8800 mg/kg (cited as up to 8 mL/kg) 100% dimethyl sulfoxide or up to 8800 mg/kg (cited as up to 16 mL/kg) 50% dimethyl sulfoxide or water for 90 days. Harmful eye effects were observed in 3-4/4 animals at the high dose for both concentrations.(35)

Ingestion:

Very high oral doses have caused significant eye and vision changes in dogs (5500 mg/kg for 11 months; 3300 or 9900 mg/kg/day for up to 2 years; 2500-40000 mg/kg for 18 weeks) and rabbits (10000 mg/kg for 11 weeks). In some cases, the changes were irreversible.(35,36,37,38,39) In one study, oral administration of 100, 500 or 1000 mg/kg/day to rabbits produced "suggestive" lens changes after 8 weeks.(12) Further details are not available for evaluation. Similar changes in the eyes and vision were not observed in monkeys exposed to up to 9000 mg/kg for 18 months.(33)

Skin Sensitization:

Dimethyl sulfoxide is not a skin sensitizer. Negative results were obtained in several studies including the Guinea pig maximization test, the Buehler test, the Draize test, the Mouse ear swelling test and a Local lymph node assay.(40,53,80) Dimethyl sulfoxide has been used, or is suggested for use, as a solvent for other chemicals in the mouse local lymph node assay because it is not a skin sensitizer itself.(54)

CHEMINFO Profile for DMSO > Toxicological Information > Effects of Long-Term (Chronic) Exposure

Carcinogenicity:

Only limited animal information was located.

Mice were orally dosed with 330 mg/kg/week in 198 administrations. Tumours were observed in 18/54 surviving mice, a significant increase over controls. Tumour sites included the lungs, liver, kidneys, and lymph nodes.(14) The reviewers indicated that the original article did not contain sufficient detail to make a detailed evaluation and that the study would not have met International Agency for Research on Carcinogens (IARC) standards. In the same study, rats were orally exposed to 3000 mg/kg/week in 243 administrations. Tumours were observed in 17/65 animals after 11.5 months. Breast tumours were observed in 7/34 females. These observations were not significantly different from controls.(14) In tumour initiation/promotion studies, dimethyl sulfoxide either showed enhancement, no effect or inhibition.(14,15,80) Dimethyl sulfoxide may enhance the skin penetration of known carcinogens.(80)

Teratogenicity, Embryotoxicity and/or Fetotoxicity:

The available evidence does not indicate that dimethyl sulfoxide is a developmental toxin. Embryotoxicity or fetotoxicity has only been seen in rats and mice exposed orally to doses that also cause maternal toxicity.

In an unpublished study conducted according to the OECD Guideline, rats were orally exposed to 0, 100, 300, or 1000 mg/kg dimethyl sulfoxide (purity 99.977%) before mating and through mating and, for females, through pregnancy until day 21 post-partum. No significant effects were observed in the offspring.(80, unconfirmed) In an unpublished study conducted according to the OECD Guideline, rabbits were orally exposed to 0, 100, 300 or 1000 mg/kg on days 7 to 28 of pregnancy. Maternal toxicity was observed at 300 mg/kg, and there were no signs of developmental toxicity.(80, unconfirmed) Mice were orally administered 3200 mg/kg on days 5-9 of pregnancy. Maternal toxicity, as evidenced by a reduction in maternal body weight, and embryotoxicity (a significant reduction in the number of implantations) were observed.(41) In a study reported by abstract, rats were given 0, 200, 1000, or 5000 mg/kg/day on days 6-15 of pregnancy. At 5000 mg/kg/day, there was a decrease in maternal body weight gain and food consumption. In the offspring, there was a decreased fetal weight and an increase in delayed ossification. No effects were seen on mothers or offspring at 1000 mg/kg/day. No statistical evaluation was reported. However, the study was reported to be performed according to OECD guidelines.(55) Other studies cannot be evaluated because of factors such as poor study design, lack of reporting on maternal toxicity, high maternal toxicity, and/or lack of statistical analysis.(42,43,44) Other studies have not reported teratogenic, embryotoxic, or fetotoxic effects.(10,42,45)

Reproductive Toxicity:

The limited information available does not indicate that dimethyl sulfoxide is a reproductive toxin.

In an unpublished study conducted according to the OECD Guideline, rats were exposed to 0, 100, 300, or 1000 mg/kg dimethyl sulfoxide (purity 99.977%) orally before mating and through mating and, for females, through pregnancy until day 21 post-partum. No significant reproductive effects were observed.(80, unconfirmed) Daily oral administration of 5000 mg/kg to both male and female rats for 4 days before mating and to females throughout pregnancy failed to interfere with fertility. Rabbits receiving dimethyl sulfoxide orally at a dose of 10000 mg/kg/day were successfully bred and had litters of normal size.(10, unconfirmed) In an unpublished, OECD-compliant study, rats were exposed to 0.31, 0.96 or 2.8 mg/L for 13 weeks (6 hr/d; 7 d/wk) using a snout-only exposure system. There were no effects noted on the estrus cycle or sperm.(80, unpublished)

Mutagenicity:

The available evidence does not indicate that dimethyl sulfoxide is mutagenic. No studies in live animals using a relevant route of exposure were located. Dimethyl sulfoxide has given mostly negative results in tests using cultured mammalian cells, bacteria, yeast, and fruit flies (*Drosophila*). Dimethyl sulfoxide is widely used as a solvent for other chemicals in mutagenicity tests.

Negative results (micronucleus, dominant lethal) and positive results (chromosome aberrations, DNA damage) have been obtained in tests using live mice and rats exposed by intraperitoneal administration, which is a not a relevant route of exposure.(14,69,80-unconfirmed)

Negative results have been obtained in most tests using cultured mammalian cells, bacteria, and yeast.(14,52,69,80-unconfirmed) Dimethyl sulfoxide is widely used as a solvent for other chemicals in mutagenicity tests. In a few tests high concentrations have given positive results in cultured mammalian cells and bacteria.(46,47,48,49,80) Negative results have been obtained in fruit flies (*Drosophila*). (14,52,60-unconfirmed)

Toxicological Synergisms:

Dimethyl sulfoxide has been shown to protect the liver and kidneys from injury produced by several drugs and chemicals in studies using animal.(70,71,72)

CHEMINFO Profile for DMSO > Ecological Information, Disposal Considerations, Transport Information

SECTION 12. ECOLOGICAL INFORMATION

NOTE : Inclusion of Ecological Information on a Safety Data Sheet (SDS) is optional under the US Hazard Communication Standard (2012), and the Canadian WHMIS regulations. In other jurisdictions, inclusion of Ecological Information may be a requirement. For specific requirements, contact the relevant regulatory authorities in the jurisdiction where the SDS is intended to be used.

The American National Standard for Hazardous Workplace Chemicals - Hazard Evaluation and Safety Data Sheet and Precautionary Labeling Preparation (ANSI Z400.1/Z129.1-2010) and the Globally Harmonized System for Classification and Labelling of Chemicals (GHS) guidance document provide advice on data that could be included in this section.

Databases in CCOHS's CHEMpendium™ collection which may contain useful Ecological Information include Transport TDG, Transport 49CFR, CESARS, HSDB® (Hazardous Substances Data Bank), and CHRIS (Chemical Hazards Response Information System).

SECTION 13. DISPOSAL CONSIDERATIONS

Review federal, provincial and local government requirements prior to disposal. Store material for disposal as indicated in Storage Conditions. Disposal by controlled incineration or secure landfill may be acceptable.

SECTION 14. TRANSPORT INFORMATION

CANADIAN TRANSPORTATION OF DANGEROUS GOODS (TDG) SHIPPING INFORMATION

This chemical is not specifically listed in the Canadian Transportation of Dangerous Goods Regulations. However, it may be regulated as a part of a chemical family or group Not Otherwise Specified (N.O.S.) (e.g. LIQUID DYES N.O.S.). Consult the regulation.

NOTE: This information incorporates the Transportation of Dangerous Goods Regulations SOR/2001-286, effective October 21, 2015.

US DEPARTMENT OF TRANSPORT (DOT) HAZARDOUS MATERIALS SHIPPING INFORMATION (49 CFR)

This chemical is not specifically listed in the US hazardous materials shipping regulations (49 CFR, Table 172.101). However, it may be regulated as part of a chemical family or group Not Otherwise Specified (N.O.S.) (e.g. mercury-based pesticides). Consult the regulation.

NOTE: This information was taken from the US Code of Federal Regulations Title 49 - Transportation and is effective February 1, 2016.

CHEMINFO Profile for DMSO > Transport Information

SECTION 15. REGULATORY INFORMATION

CANADIAN WORKPLACE HAZARDOUS MATERIALS INFORMATION SYSTEM (WHMIS) 1988

CCOHS WHMIS 1988 Classification:

B3 - Flammable and combustible material - Combustible liquid



B3 - Combustible Liquid

WHMIS 1988 Health Effects Criteria Met by this Chemical:

Insufficient information

WHMIS 1988 Ingredient Disclosure List:

Included for disclosure at 1% or greater.

Detailed WHMIS 1988 Classification According to Criteria:

Class A - Compressed Gas:

Does not meet criteria.

Class B - Flammable and Combustible Material:

Meets criteria for "Combustible liquid".
Closed cup flash point: 87 deg C (188.6 deg F).

Class C - Oxidizing Material:

Does not meet criteria.

Class D - Poisonous and Infectious Material. Division 1 - Immediate and Serious Toxic Effects:

Does not meet criteria.

Acute Lethality:

Does not meet criteria.
LC50 (rat): greater than 5330 mg/m³ (vapour/aerosol mixture) (4-hour exposure); LD50 (oral, rat): 14500 mg/kg (an unconfirmed value - LD50 (oral, mouse): 7920 mg/kg has also been reported); no reliable LD50 (dermal) values were located.

Class D - Poisonous and Infectious Material. Division 2 - Other Toxic Effects:

Insufficient information for classification.
See detailed evaluation below.

Chronic Health Effects:

Does not meet criteria.
No significant toxic effects observed in humans or animals.

Carcinogenicity:

Does not meet criteria. Not included in standard reference lists.

Teratogenicity and Embryotoxicity:

Does not meet criteria.
Embryotoxicity or fetotoxicity has been seen in rats and mice exposed orally to doses which also cause maternal toxicity. Other animal studies cannot be evaluated due to poor reporting and/or study design, or have not reported teratogenic, embryotoxic, or fetotoxic effects. No human information was located.

Reproductive Toxicity:

Does not meet criteria.
The limited animal information located has not shown reproductive effects.
No human information was located.

Mutagenicity:

Does not meet criteria.
No human information was located. No studies in live animals using a relevant route of exposure were located. Mostly negative results were obtained in in tests using cultured mammalian cells, bacteria, yeast, and fruit flies (*Drosophila*).

Respiratory Tract Sensitization:

Does not meet criteria.
Not reported as human respiratory sensitizer.

Skin Irritation:

Does not meet criteria.
Very mild skin irritant, based on animal and limited human information.

Eye Irritation:

Does not meet criteria.
Not irritating or a very mild eye irritant, based on human and animal information.

Skin Sensitization:

Does not meet criteria.
Skin sensitization was not observed in human volunteers or in animal tests.
Non-immunological whealing and flaring have been observed in animals and humans.

CHEMINFO Profile for DMSO > Transport Information, Other Information – Selected Bibliography

Class E - Corrosive Material:

Does not meet criteria.
Not corrosive to animal skin. Probably not corrosive to carbon steel or aluminum.

Class F - Dangerously Reactive Material:

Does not meet criteria.

EUROPEAN UNION (EU) CLASSIFICATION AND LABELLING INFORMATION

Harmonized classifications derived from Annex VI to the European Union Classification, Labelling and Packaging (CLP) Regulation can be found in the ECHA C&L Inventory. The CLP Regulation is the European Union implementation of the Globally Harmonized System of Classification and Labelling of Chemicals (GHS). For current information, see: <http://echa.europa.eu/regulations/clp/cl-inventory>

NOTE: The harmonized hazard classifications contained in the C&L Inventory may not necessarily be the same as hazard classifications obtained according to the classification criteria of WHMIS 2015 or the U.S. Hazard Communication Standard 2012.

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Information on chemicals reviewed in the CHEMINFO database is drawn from a number of publicly available sources. A list of general references used to compile CHEMINFO records is available in the database Help.

OSH References

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Patient care aides: differences in healthcare coverage, health-related behaviors, and health outcomes in a low-wage workforce by healthcare setting.	English	2020	NIOSH TIC-2
Comparative analyses of workers' compensation claims of injury among temporary and permanent employed workers in Ohio.	English	2020	NIOSH TIC-2
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MARKED RECORDS