Dimethyl sulfoxide-d6

sc-257361

Material Safety Data Sheet

Hazard Alert Code Key: EXTREME | HIGH | MODERATE | LOW

Section 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME

Dimethyl sulfoxide-d6

STATEMENT OF HAZARDOUS NATURE

CONSIDERED A HAZARDOUS SUBSTANCE ACCORDING TO OSHA 29 CFR 1910.1200.

NFPA

SUPPLIER

Company: Santa Cruz Biotechnology, Inc.
Address:
2145 Delaware Ave
Santa Cruz, CA 95060

Telephone: 800.457.3801 or 831.457.3800

Emergency Tel: **CHEMWATCH: From within the US and Canada: 877-715-9305**

Emergency Tel: **From outside the US and Canada: +800 2436 2255 (1-800-CHEMCALL) or call +613 9573 3112**

PRODUCT USE

■ Reagent.

SYNONYMS

C2-D6-O-S, "methane-D3, sulfinylbis", "(methyl sulfoxide)-D6", bis(trideuteriomethyl)sulfoxide, bis(trideuteromethyl)sulfoxide, di(methyl-D3)sulfoxide, "dimethyl-D6 sulfoxide", DMSO-D6, "hexadeuteriodimethyl sulfoxide", "perdeuteriodimethyl sulfoxide", sulfonylbis(methane-D3), sulfinylbismethane-D3

Section 2 - HAZARDS IDENTIFICATION

CHEMWATCH HAZARD RATINGS

		Min Max
Flammability:	1	
Toxicity:	2	
Body Contact:	2	
Reactivity:	1	
Chronic:	2	

Min/Nil=0
Low=1
Moderate=2
High=3
Extreme=4

CANADIAN WHMIS SYMBOLS

EMERGENCY OVERVIEW

RISK

HARMFUL - May cause lung damage if swallowed.
Irritating to eyes, respiratory system and skin.

POTENTIAL HEALTH EFFECTS

ACUTE HEALTH EFFECTS

SWALLOWED

- Swallowing of the liquid may cause aspiration into the lungs with the risk of chemical pneumonitis; serious consequences may result. (ICSC13733).
- Accidental ingestion of the material may be damaging to the health of the individual.
- DMSO has shows very few toxic symptoms in humans. The most common are nausea, skin rashes and an unusual garlic-onion-oyster smell on body and breath. Ingestion of large quantities of DMSO may cause nausea, vomiting, diarrhoea, cramps, chills and drowsiness.

EYE

- Evidence exists, or practical experience predicts, that the material may cause eye irritation in a substantial number of individuals. Prolonged eye contact may cause inflammation characterized by a temporary redness of the conjunctiva (similar to windburn).
- Direct contact with aqueous solutions containing 75-90% DMSO produce irritation with temporary stinging and burning. Lower concentrations do not appear to cause injury and are tolerated well. Application, full strength to rabbit eye, produces pain, moderate discharge, corneal epithelium injury and dilation of the conjunctival blood vessels with haemorrhage. The effects are reversed within 2 days.

SKIN

- The material may cause mild but significant inflammation of the skin either following direct contact or after a delay of some time. Repeated exposure can cause contact dermatitis which is characterized by redness, swelling and blistering.
- Skin contact with the material may damage the health of the individual; systemic effects may result following absorption.
- Stinging and burning of the skin as well as rashes and vesicles have been seen. A heat reaction may occur if applied to wet skin

Absorption through the skin may produce a garlic-like odour on the breath as a result of conversion within the body to mercaptans. Other effects of absorption include transient disturbances of colour vision, photophobia, headache, diarrhoea, anaesthesia, lethargy, drowsiness, chills, chest
pains, burning and aching eyes. Topical application is often employed to increase dermal absorption of many chemicals including drugs and allergens of moderate molecular weight. Skin contact with concentrated solutions may produce erythema, itching, scaling, a transient burning sensation, and
possible blistering. Histamine release may result in urticarial wheal and flare. Transient haemolysis with haemoglobinuria has also been reported. Occluded patch testing has produced enhanced irritation, epidermal vesiculation, histological evidence of dermal death, and perivascular dermal infiltrates. Occasional hypersensitivity reactions, including anaphylaxis, have been described

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

- Open cuts, abraded or irritated skin should not be exposed to this material.
- Entry into the blood-stream, through, for example, cuts, abrasions or lesions, may produce systemic injury with harmful effects. Examine the skin prior to the use of the material and ensure that any external damage is suitably protected.

INHALED

- The material can cause respiratory irritation in some persons. The body's response to such irritation can cause further lung damage.
- Inhalation hazard is increased at higher temperatures.
- Inhalation of aerosols/ vapours of may result in coughing or burning sensation. High concentrations may produce systemic effects such as nausea, vomiting, chills, cramps, headache, dizziness, and lethargy. Allergic respiratory reactions may also occur. The lethal dose for rabbits is reportedly 1600 mg/m3/4hours.

Animals subject to DMSO spray for 5 minutes, 10 times over 15 days showed liver damage and bronchopneumonia. Histamine release may produce bronchoconstriction, wheezing.

CHRONIC HEALTH EFFECTS

- Long-term exposure to respiratory irritants may result in disease of the airways involving difficult breathing and related systemic problems.

Limited evidence suggests that repeated or long-term occupational exposure may produce cumulative health effects involving organs or biochemical systems.

There is some evidence that inhaling this product is more likely to cause a sensitization reaction in some persons compared to the general population.

There is limited evidence that, skin contact with this product is more likely to cause a sensitization reaction in some persons compared to the general population.

When 90 ml of 90% DMSO were applied to the entire trunk of 20 men daily for 6 months, bad breath, transient erythema, burning and stinging were apparent. Dermatitis, accompanied by moderate inflammation, regressed as treatment continued. Continuous applications under an occluding membrane produced hardening of the skin within a month.

Crystalline lens alterations, resembling juvenile nuclear sclerosis, has been produced in test animals, but not in man, following chronic dermal exposure.

Rabbits exposed to DMSO mists for 5 months developed chemical pneumonia, cloudy swelling of the liver and signs of renal toxicity. Reproductive effects have been reported in animals.

Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS

NAME	CAS RN	%
dimethyl sulfoxide-D6	2206-27-1	>98
contains		
dimethyl sulfoxide	67-68-5	

Section 4 - FIRST AID MEASURES

SWALLOWED

■

- If swallowed do NOT induce vomiting.
- If vomiting occurs, lean patient forward or place on left side (head-down position, if possible) to maintain open airway and prevent aspiration.
- Observe the patient carefully.
- Never give liquid to a person showing signs of being sleepy or with reduced awareness; i.e. becoming unconscious.
- Give water to rinse out mouth, then provide liquid slowly and as much as casualty can comfortably drink.
- Seek medical advice.
- If spontaneous vomiting appears imminent or occurs, hold patient's head down, lower than their hips to help avoid possible aspiration of vomitus.

EYE

■ If this product comes in contact with the eyes:

- Wash out immediately with fresh running water.
- Ensure complete irrigation of the eye by keeping eyelids apart and away from eye and moving the eyelids by occasionally lifting the upper and lower lids.
- If pain persists or recurs seek medical attention.
- Removal of contact lenses after an eye injury should only be undertaken by skilled personnel.

SKIN

■ If skin contact occurs:

- Immediately remove all contaminated clothing, including footwear
- Flush skin and hair with running water (and soap if available).
- Seek medical attention in event of irritation.

INHALED

■

- If fumes or combustion products are inhaled remove from contaminated area.
- Lay patient down. Keep warm and rested.
- Prostheses such as false teeth, which may block airway, should be removed, where possible, prior to initiating first aid procedures.
- Apply artificial respiration if not breathing, preferably with a demand valve resuscitator, bag-valve mask device, or pocket mask as trained. Perform CPR if necessary.
- Transport to hospital, or doctor, without delay.

NOTES TO PHYSICIAN

■ Any material aspirated during vomiting may produce lung injury. Therefore emesis should not be induced mechanically or pharmacologically. Mechanical means should be used if it is considered necessary to evacuate the stomach contents; these include gastric lavage after endotracheal intubation. If spontaneous vomiting has occurred after ingestion, the patient should be monitored for difficult breathing, as adverse effects of aspiration into the lungs may be delayed up to 48 hours.
Treat symptomatically.

Section 5 - FIRE FIGHTING MEASURES

Vapor Pressure (mmHg):	0.398
Upper Explosive Limit (%):	29
Specific Gravity (water=1):	1.10
Lower Explosive Limit (%):	2.6

EXTINGUISHING MEDIA

■

- Water spray or fog.
- Foam.
- Dry chemical powder.
- BCF (where regulations permit).
- Carbon dioxide.

FIRE FIGHTING

■

- Alert Emergency Responders and tell them location and nature of hazard.
- Wear full body protective clothing with breathing apparatus.
- Prevent, by any means available, spillage from entering drains or water course.
- Use water delivered as a fine spray to control fire and cool adjacent area.
- Avoid spraying water onto liquid pools.
- Do not approach containers suspected to be hot.
- Cool fire exposed containers with water spray from a protected location.
- If safe to do so, remove containers from path of fire.

GENERAL FIRE HAZARDS/HAZARDOUS COMBUSTIBLE PRODUCTS

■

- Combustible.
- Slight fire hazard when exposed to heat or flame.
- Heating may cause expansion or decomposition leading to violent rupture of containers.
- On combustion, may emit toxic fumes of carbon monoxide (CO).
- May emit acrid smoke.
- Mists containing combustible materials may be explosive.

Combustion products include: carbon dioxide (CO_2), sulfur oxides (SO_x), other pyrolysis products typical of burning organic material.
May emit poisonous fumes.
May emit corrosive fumes.

FIRE INCOMPATIBILITY

■ Avoid contamination with oxidizing agents i.e. nitrates, oxidizing acids,chlorine bleaches, pool chlorine etc. as ignition may result.

PERSONAL PROTECTION

Glasses:
Safety Glasses.
Chemical goggles.
Gloves:
Respirator:
Type A Filter of sufficient capacity

Section 6 - ACCIDENTAL RELEASE MEASURES

MINOR SPILLS

■

- Remove all ignition sources.
- Clean up all spills immediately.
- Avoid breathing vapors and contact with skin and eyes.
- Control personal contact by using protective equipment.
- Contain and absorb spill with sand, earth, inert material or vermiculite.
- Wipe up.
- Place in a suitable labeled container for waste disposal.

MAJOR SPILLS

■ Chemical Class: sulfates and sulfites

For release onto land: recommended sorbents listed in order of priority.

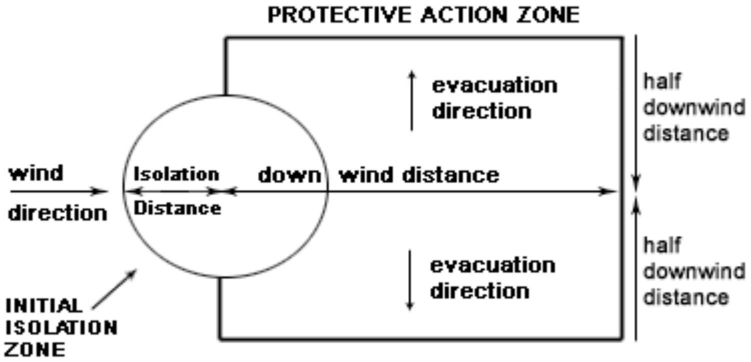
SORBENT TYPE	RANK	APPLICATION	COLLECTION	LIMITATIONS
LAND SPILL - SMALL				
cross-linked polymer - particulate	1	shovel	shovel	R, W, SS
wood-fiber - pillow	1	throw	pitchfork	R, P, DGC, RT
treated wood fiber - pillow	1	throw	pitchfork	DGC, RT
cross-linked polymer - pillow	1	throw	pitchfork	R, DGC, RT
sorbent clay - particulate	2	shovel	shovel	R, I, P
foamed glass - pillow	2	throw	pitchfork	R, P, DGC, RT
LAND SPILL - MEDIUM				
cross-linked polymer - particulate	1	blower	skiploader	R,W, SS
sorbent clay - particulate	2	blower	skiploader	R, I, P
polypropylene - particulate	2	blower	skiploader	R, SS, DGC
expanded mineral - particulate	3	blower	skiploader	R, I, W, P, DGC
wood fiber - particulate	3	blower	skiploader	R, W, P, DGC
polypropylene - mat	3	throw	skiploader	DGC, RT

Legend
DGC: Not effective where ground cover is dense
R; Not reusable

I: Not incinerable
P: Effectiveness reduced when rainy
RT:Not effective where terrain is rugged
SS: Not for use within environmentally sensitive sites
W: Effectiveness reduced when windy
Reference: Sorbents for Liquid Hazardous Substance Cleanup and Control;
R.W Melvold et al: Pollution Technology Review No. 150: Noyes Data Corporation 1988.
Moderate hazard.

- Clear area of personnel and move upwind.
- Alert Emergency Responders and tell them location and nature of hazard.
- Wear breathing apparatus plus protective gloves.
- Prevent, by any means available, spillage from entering drains or water course.
- No smoking, naked lights or ignition sources. Increase ventilation.
- Stop leak if safe to do so.
- Contain spill with sand, earth or vermiculite.
- Collect recoverable product into labeled containers for recycling.
- Absorb remaining product with sand, earth or vermiculite.
- Collect solid residues and seal in labeled drums for disposal.
- Wash area and prevent runoff into drains.
- If contamination of drains or waterways occurs, advise emergency services.

PROTECTIVE ACTIONS FOR SPILL



From IERG (Canada/Australia)	
Isolation Distance	-
Downwind Protection Distance	-

From US Emergency Response Guide 2000 Guide No guide found.

FOOTNOTES

1 PROTECTIVE ACTION ZONE is defined as the area in which people are at risk of harmful exposure. This zone assumes that random changes in wind direction confines the vapour plume to an area within 30 degrees on either side of the predominant wind direction, resulting in a crosswind protective action distance equal to the downwind protective action distance.
2 PROTECTIVE ACTIONS should be initiated to the extent possible, beginning with those closest to the spill and working away from the site in the downwind direction. Within the protective action zone a level of vapour concentration may exist resulting in nearly all unprotected persons becoming incapacitated and unable to take protective action and/or incurring serious or irreversible health effects.
3 INITIAL ISOLATION ZONE is determined as an area, including upwind of the incident, within which a high probability of localised wind reversal may expose nearly all persons without appropriate protection to life-threatening concentrations of the material.
4 SMALL SPILLS involve a leaking package of 200 litres (55 US gallons) or less, such as a drum (jerrican or box with inner containers). Larger packages leaking less than 200 litres and compressed gas leaking from a small cylinder are also considered "small spills". LARGE SPILLS involve many small leaking packages or a leaking package of greater than 200 litres, such as a cargo tank, portable tank or a "one-tonne" compressed gas cylinder.
5 Guide No guide found. is taken from the US DOT emergency response guide book.
6 IERG information is derived from CANUTEC - Transport Canada.

ACUTE EXPOSURE GUIDELINE LEVELS (AEGL) (in ppm)

AEGL 1: The airborne concentration of a substance above which it is predicted that the general population, including susceptible individuals, could experience notable discomfort, irritation, or certain asymptomatic nonsensory effects. However, the effects are not disabling and are transient and reversible upon cessation of exposure.
AEGL 2: The airborne concentration of a substance above which it is predicted that the general population, including susceptible individuals, could experience irreversible or other serious, long-lasting adverse health effects or an impaired ability to escape.
AEGL 3: The airborne concentration of a substance above which it is predicted that the general population, including susceptible individuals, could experience life-threatening health effects or death.

Section 7 - HANDLING AND STORAGE

PROCEDURE FOR HANDLING

■

- DO NOT allow clothing wet with material to stay in contact with skin
- Avoid all personal contact, including inhalation.
- Wear protective clothing when risk of exposure occurs.
- Use in a well-ventilated area.
- Prevent concentration in hollows and sumps.
- DO NOT enter confined spaces until atmosphere has been checked.
- Avoid smoking, naked lights or ignition sources.
- Avoid contact with incompatible materials.
- When handling, DO NOT eat, drink or smoke.
- Keep containers securely sealed when not in use.
- Avoid physical damage to containers.
- Always wash hands with soap and water after handling.
- Work clothes should be laundered separately.
- Use good occupational work practice.
- Observe manufacturer's storing and handling recommendations.
- Atmosphere should be regularly checked against established exposure standards to ensure safe working conditions.

RECOMMENDED STORAGE METHODS

■ Glass container.

- Metal can or drum
- Packing as recommended by manufacturer.
- Check all containers are clearly labeled and free from leaks.

STORAGE REQUIREMENTS

■

- Store in original containers.
- Keep containers securely sealed.
- No smoking, naked lights or ignition sources.
- Store in a cool, dry, well-ventilated area.
- Store away from incompatible materials and foodstuff containers.
- Protect containers against physical damage and check regularly for leaks.
- Observe manufacturer's storing and handling recommendations.

SAFE STORAGE WITH OTHER CLASSIFIED CHEMICALS

+ X + X X +

X: Must not be stored together
O: May be stored together with specific preventions
+: May be stored together

Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

EXPOSURE CONTROLS

Source	Material	TWA ppm	TWA mg/m³	STEL ppm	STEL mg/m³	Peak ppm	Peak mg/m³	TWA F/CC	Notes
US AIHA Workplace Environmental Exposure Levels (WEELs)	dimethyl sulfoxide (Dimethyl Sulfoxide)	250							

The following materials had no OELs on our records

• dimethyl sulfoxide-D6: CAS:2206-27-1

MATERIAL DATA

DIMETHYL SULFOXIDE:
DIMETHYL SULFOXIDE-D6:

■ Sensory irritants are chemicals that produce temporary and undesirable side-effects on the eyes, nose or throat. Historically occupational exposure standards for these irritants have been based on observation of workers' responses to various airborne concentrations. Present day expectations require that nearly every individual should be protected against even minor sensory irritation and exposure standards are established using uncertainty factors or safety factors of 5 to 10 or more. On occasion animal no-observable-effect-levels (NOEL) are used to determine these limits where human results are unavailable. An additional approach, typically used by the TLV committee (USA) in determining respiratory standards for this group of chemicals, has been to assign ceiling values (TLV C) to rapidly acting irritants and to assign short-term exposure limits (TLV STELs) when the weight of evidence from irritation, bioaccumulation and other endpoints combine to warrant such a limit. In contrast the MAK Commission (Germany) uses a five-category system based on intensive odour, local irritation, and elimination half-life. However this system is being replaced to be consistent with the European Union (EU) Scientific Committee for Occupational Exposure Limits (SCOEL); this is more closely allied to that of the USA.

OSHA (USA) concluded that exposure to sensory irritants can:

- cause inflammation
- cause increased susceptibility to other irritants and infectious agents
- lead to permanent injury or dysfunction
- permit greater absorption of hazardous substances and
- acclimate the worker to the irritant warning properties of these substances thus increasing the risk of overexposure.

DIMETHYL SULFOXIDE:

■ Designated H in List of MAK values: Danger of cutaneous absorption. Absorption of such substances through the skin can pose an incomparably larger danger of toxicity than their inhalation. To avoid health risks when handling such substances, meticulous cleaning of the skin, hair and clothing is imperative.

MAK values, and categories and groups are those recommended within theFederal Republic of Germany.

PERSONAL PROTECTION




Consult your EHS staff for recommendations

EYE

■

- Safety glasses with side shields.
- Chemical goggles.
- Contact lenses pose a special hazard; soft lenses may absorb irritants and all lenses concentrate them. DO NOT wear contact lenses.

HANDS/FEET

■ Wear chemical protective gloves, eg. PVC.

Wear safety footwear or safety gumboots, eg. Rubber.

NOTE: The material may produce skin sensitization in predisposed individuals. Care must be taken, when removing gloves and other protective equipment, to avoid all possible skin contact.

Suitability and durability of glove type is dependent on usage. Important factors in the selection of gloves include: such as:

- frequency and duration of contact,
- chemical resistance of glove material,
- glove thickness and
- dexterity

Select gloves tested to a relevant standard (e.g. Europe EN 374, US F739).

- When prolonged or frequently repeated contact may occur, a glove with a protection class of 5 or higher (breakthrough time greater than 240 minutes according to EN 374) is recommended.
- When only brief contact is expected, a glove with a protection class of 3 or higher (breakthrough time greater than 60 minutes according to EN 374) is recommended.
- Contaminated gloves should be replaced.

Gloves must only be worn on clean hands. After using gloves, hands should be washed and dried thoroughly. Application of a non-perfumed moisturiser is recommended.

- Aprotic solvents may greatly promote the toxic properties of solutes because of their unique ability to penetrate synthetic rubber protective gloves and the skin (butyl rubber gloves are reported to be more satisfactory than others
- Neoprene gloves

OTHER

■

- Overalls.
- P.V.C. apron.
- Barrier cream.
- Skin cleansing cream.
- Eye wash unit.

RESPIRATOR

■ Selection of the Class and Type of respirator will depend upon the level of breathing zone contaminant and the chemical nature of the contaminant. Protection Factors (defined as the ratio of contaminant outside and inside the mask) may also be important.

Breathing Zone Level ppm (volume)	Maximum Protection Factor	Half-face Respirator	Full-Face Respirator
1000	10	A-1	-
1000	50	-	A-1
5000	50	Airline*	-
5000	100	-	A-2
10000	100	-	A-3
	100+		Airline* *

* - Continuous Flow ** - Continuous-flow or positive pressure demand.
The local concentration of material, quantity and conditions of use determine the type of personal protective equipment required.
Use appropriate NIOSH-certified respirator based on informed professional judgement. In conditions where no reasonable estimate of exposure can be made, assume the exposure is in a concentration IDLH and use NIOSH-certified full face pressure demand SCBA with a minimum service life of 30 minutes, or a combination full facepiece pressure demand SAR with auxiliary self-contained air supply. Respirators provided only for escape from IDLH atmospheres shall be NIOSH-certified for escape from the atmosphere in which they will be used.

ENGINEERING CONTROLS

■ General exhaust is adequate under normal operating conditions. Local exhaust ventilation may be required in special circumstances. If risk of overexposure exists, wear an approved respirator An approved respirator (supplied air type) may be required in special circumstances. Correct fit is essential to ensure adequate protection. Provide adequate ventilation in warehouses and enclosed storage areas.
Air contaminants generated in the workplace possess varying "escape" velocities which, in turn, determine the "capture velocities" of fresh circulating air required to effectively remove the contaminant.

Type of Contaminant:	Air Speed:
solvent, vapors, degreasing etc., evaporating from tank (in still air).	0.25-0.5 m/s (50-100 f/min)
aerosols, fumes from pouring operations, intermittent container filling, low speed conveyer transfers, welding, spray drift, plating acid fumes, pickling (released at low velocity into zone of active generation)	0.5-1 m/s (100-200 f/min.)
direct spray, spray painting in shallow booths, drum filling, conveyer loading, crusher dusts, gas discharge (active generation into zone of rapid air motion)	1-2.5 m/s (200-500 f/min.)
grinding, abrasive blasting, tumbling, high speed wheel generated dusts (released at high initial velocity into zone of very high rapid air motion)	2.5-10 m/s (500-2000 f/min.)

Within each range the appropriate value depends on:

Lower end of the range	Upper end of the range
1: Room air currents minimal or favorable to capture	1: Disturbing room air currents
2: Contaminants of low toxicity or of nuisance value only.	2: Contaminants of high toxicity
3: Intermittent, low production.	3: High production, heavy use
4: Large hood or large air mass in motion	4: Small hood-local control only

Simple theory shows that air velocity falls rapidly with distance away from the opening of a simple extraction pipe. Velocity generally decreases with the square of distance from the extraction point (in simple cases). Therefore the air speed at the extraction point should be adjusted, accordingly, after reference to distance from the contaminating source. The air velocity at the extraction fan, for example, should be a minimum of 1-2 m/s (200-400 f/min) for extraction of solvents generated in a tank 2 meters distant from the extraction point. Other mechanical considerations, producing performance deficits within the extraction apparatus, make it essential that theoretical air velocities are multiplied by factors of 10 or more when extraction systems are installed or used.

Section 9 - PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL PROPERTIES

Liquid.
Mixes with water.

State	Liquid	Molecular Weight	84.17
Melting Range (°F)	65.12	Viscosity	1.21 cSt@40°C
Boiling Range (°F)	372.2	Solubility in water (g/L)	Miscible
Flash Point (°F)	192.2- 203	pH (1% solution)	Not applicable.
Decomposition Temp (°F)	212 approx.	pH (as supplied)	Not applicable
Autoignition Temp (°F)	419 (300)	Vapor Pressure (mmHg)	0.398
Upper Explosive Limit (%)	29	Specific Gravity (water=1)	1.10
Lower Explosive Limit (%)	2.6	Relative Vapor Density (air=1)	2.7
Volatile Component (%vol)	100 approx.	Evaporation Rate	1.4 BuAc=1

APPEARANCE

Clear colourless, very hygroscopic liquid, practically no odour or slight garlic odour, slightly bitter taste with sweet after-taste. Miscible in water, alcohol, ether, benzene, chloroform and acetone. .Viscosity (27 C): 1.1 cps. Evaporation rate (n-butyl acetate=1): 1.4 Upper explosive limit in air has been reported as high as 63%. Dimethyl sulfoxide has been shipped as UN 2810 Poisonous Liquid, N.O.S.

DMSO is a liquid (density 1.1) with no color but in some cases a light characteristic sulfur odor due to traces of the raw material dimethyl sulfide. DMSO has a melting point of 18.5 C and a boiling point of 189 C (at 1,013 hPa). Its log Kow is of –1.35 (measured). DMSO has a vapor pressure of 0.81 hPa at 25 C and a Henry law's constant of 1.17 10+5 mol.kg-1.atm-1. DMSO is miscible in all proportion with water and with most of the common organic solvents such as alcohols, esters, ketones, ethers, chlorinated solvents and aromatics. DMSO is stable in water and is not expected to volatilize. DMSO Log Koc is estimated to be equal to 0.64. This value suggests that DMSO is mobile in soil. DMSO is not expected to adsorb to suspended solids, sediments and soils. In atmosphere, DMSO is not susceptible to direct photolysis by sunlight. Calculations indicate DMSO half-life values, for reaction with OH radicals, from ca 2 to 6 h The LC50 (96 hrs.) for ten species of fish range from 32,500 to 43,000 ppm. The LC50 for two species of protozoans are 32,000 and 38,000 ppm. The concentration required to inhibit growth (EC50) for five species of blue-green algae and one green algae species ranged from 0.4 to 4.0%. DMSO is non-bio-accumulating since the log of the octanol/water partition coefficient (log Kow) is -2.03.

Material	Value
■ log Kow (Sangster 1997)	- 1.35

Section 10 - CHEMICAL STABILITY

CONDITIONS CONTRIBUTING TO INSTABILITY

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- Presence of incompatible materials.
- Product is considered stable.
- Hazardous polymerization will not occur.

STORAGE INCOMPATIBILITY

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- Many aprotic (non-hydroxylic) solvents are not inert towards other reagents and care must be taken when using untried combinations of solvents an reagents for the first time.
- Some aprotic solvents have a dramatic effect on reaction rates

Dimethyl sulfoxide:

- reacts violently or explosively with oxidisers, acryl halides, aryl halides and related compounds, non-metallic chlorides and other active halogen compounds, p-bromobenzoyl acetanilide, diborane, boron compounds, iodine pentafluoride, magnesium perchlorate, methyl bromide, perchloric acid, periodic acid, silver fluoride, sodium hydride, potassium permanganate
- forms powerfully explosive mixtures with metal salts of oxoacids

All blends containing DMSO must be buffered at pH 7-9 before distillation.

Prolonged heating above 15 deg.C (302 deg. F) can cause rapid,exothermic decomposition.

- Sulfoxide ion may react violently or explosively with acyl halides, non-metal halides, benzenesulfonyl halides, cyanuric halides, oxalyl phosphorus trihalides, phosphorus oxyhalides, sulfuryl halides and thionyl halides.

These violent reactions may occur as a result of exothermic polymerization of formaldehyde produced by the interaction of the sulfoxide with reactive halides, and acidic or basic reagents.

- Alkyl halides may produce a delayed, vigorous and strongly exothermic reaction.
- Strong bases may produce violent ignition.
- Mixtures of metal salts of oxoacids and sulfoxides may produce powerful explosives; the water in hydrated oxo-salts (aluminium perchlorate, iron(III) perchlorate, iron(III) nitrate) may be replaced by dimethyl or other sulfoxides to give solvated salts which are potentially explosive.
- Metal nitrates and perchlorates, solvated with alkyl sulfoxides, are potentially powerful explosives, and under certain conditions may produce violent reactions which are easily triggered.
- Excessive sulfoxide may react explosively with sodium hydride.

This may again be explained in terms of exothermic polymerization of formaldehyde produced by reaction with the hydride base.

- Interaction with potassium may be violent.
- Interaction of sulfoxide with some acid anhydrides or halides may be explosive.
- Lower members of the salts formed between organic sulfoxides and perchloric acid are unstable and explosive when dry.
- Sulfoxides alone may decompose violently at elevated temperatures e.g. dimethyl sulfoxide 270-355 deg. C., cyclohexyl methyl sulfoxide 181-255 deg. C., methyl phenyl sulfoxide, 233-286 deg. C.

Avoid reaction with oxidizing agents.

For incompatible materials - refer to Section 7 - Handling and Storage.

Section 11 - TOXICOLOGICAL INFORMATION

DIMETHYL SULFOXIDE-D6

TOXICITY AND IRRITATION

■ unless otherwise specified data extracted from RTECS - Register of Toxic Effects of Chemical Substances.

■ Asthma-like symptoms may continue for months or even years after exposure to the material ceases. This may be due to a non-allergenic condition known as reactive airways dysfunction syndrome (RADS) which can occur following exposure to high levels of highly irritating compound. Key criteria for the diagnosis of RADS include the absence of preceding respiratory disease, in a non-atopic individual, with abrupt onset of persistent asthma-like symptoms within minutes to hours of a documented exposure to the irritant. A reversible airflow pattern, on spirometry, with the presence of moderate to severe bronchial hyperreactivity on methacholine challenge testing and the lack of minimal lymphocytic inflammation, without eosinophilia, have also been included in the criteria for diagnosis of RADS. RADS (or asthma) following an irritating inhalation is an infrequent disorder with rates related to the concentration of and duration of exposure to the irritating substance. Industrial bronchitis, on the other hand, is a disorder that occurs as result of exposure due to high concentrations of irritating substance (often particulate in nature) and is completely reversible after exposure ceases. The disorder is characterised by dyspnea, cough and mucus production.

For dimethyl sulfoxide (DMSO):

No data is available on the absorption of DMSO by inhalation exposure. However, its physico-chemical properties (low molecular size, high polarity and water solubility) suggest that DMSO is significantly absorbed by the inhalation route. DMSO appears to be readily absorbed through the skin. An in vitro permeability rate of 176 g/m2.hour has been reported for human skin. Maximal serum concentration of DMSO occurred at 4 to 8 hours following skin contact in humans, and at 2 hours in rats. DMSO is also well absorbed after oral exposure. Peak plasma concentration of DMSO was attained at 4 hours after oral dosing in humans and at 0.5 hours in rats. DMSO is widely distributed to all body tissues. Higher concentrations of DMSO were found in the kidney, spleen, lung, heart and testes of rats given an oral dose, while higher levels were noted in the spleen, liver and lungs following a dermal dose. In humans, the plasma DMSO clearance half-life was about 11 to 14 hours, and 20 hours after dermal and oral dosing, respectively. A shorter clearance half-life of 6 hours was observed in rats after both routes of exposure. Metabolism of DMSO takes place primarily in the liver and kidneys. The principal metabolite is dimethyl sulfone (DMSO2). Peak plasma levels of DMSO2 in humans were observed at 72 to 96 hours after dosing, and then declined with a half-life of about 60 to 72 hours. DMSO is excreted unchanged or as the metabolite DMSO2 in the urine. In the human, about 13 and 18% of a dermal dose, and 51% and 10% of an oral dose were accounted for by urinary excretion of DMSO and DMSO2, respectively.

DMSO is of low acute toxicity. In non-guideline studies, LD50 in rats are generally higher than 20,000 mg/kg bw and 40,000 mg/kg bw by the oral and dermal routes, respectively. In an acute inhalation study performed following the OECD TG 403, the LC50 in rats was higher than 5,000 mg/m3 for a 4-hour exposure.

A skin irritation assay performed in rabbit according to the OECD TG 404 revealed no more than a very slight or well-defined erythema, which disappeared in 3 days. In humans, repeated application of DMSO solution for up to several months could induce transient erythema, burning, stinging and itching, which returned to normal after discontinuation of treatment. In one study in humans, occlusive exposure to DMSO caused cell death of the outer epidermis, followed by rapid regeneration.

DMSO is slightly irritating for the eye. In studies performed following the OECD TG 405 or the EEC method B.5, a slight to moderate conjunctival irritation, which cleared in 3 days, was observed in the eyes of rabbits. A repeated instillation (100% DMSO, 3 times/day for 6 months) in the eyes of rabbits induced only a temporary lacrimation but did not show any changes in the iris, cornea, lens, retina, conjunctiva and lids. In humans, the instillation of solutions containing 50 to 100% DMSO has caused transient sensation of burning which was reversible within 24 hours.

DMSO is not a skin sensitiser. Sensitisation tests performed in guinea pigs and mice following methods comparable to the OECD TG 406 were uniformly negative. A skin sensitization assay performed in humans was also negative.

Repeat dose toxicity: DMSO is of low toxicity by repeated administration. According to the results of a 13-week inhalation toxicity study compliant with the OECD TG 413, the No Adverse Effects Concentration (NOAEC) for DMSO could be established at ca. 1,000 mg/m3 for respiratory tract irritation and ca. 2,800 mg/m3 (the highest concentration tested) for systemic toxicity. Other non-guideline repeated dose toxicity studies performed by different routes of administration and with several mammalian species have also shown that DMSO produced only slight systemic toxicity. With the exception of a decrease of the body weight gain and some hematological effects (which could be secondary to an increased diuresis) at very high dose levels, the most common finding observed in these studies is changes of the refractive power of the lens. These ocular changes were observed following repeated oral application of DMSO at doses of around 3,000 mg/kg bw/d in rats for 18 months and 1,000 mg/kg bw/d in dogs for 2 years. Following repeated dermal application, the same effects were observed at doses of around 1,000 mg/kg bw/d in rabbits for 30 days, in dogs for 118 days and in pigs for 18 weeks. Similar ocular changes were not observed in monkeys following dermal application at doses of up to 9,000 mg/kg bw/d for 18 months (dose levels that caused marked ocular toxicity in sensitive species). Clinical signs of systemic toxicity and the alterations of the lens were also never observed or reported in clinical and epidemiological studies performed in humans, even after exposure to a high dose level (1,000 mg/kg/d for 3 months) or for a long period of time (up to 19 months). Overall, primates appear to be much less sensitive to DMSO ocular toxicity, and the ocular changes observed in rats, rabbits, dogs or pigs are not considered relevant for human health. Then, it is possible to estimate that the No Observed Adverse Effect Levels (NOAELs) by oral or dermal routes would be close to 1,000 mg/kg bw/d.

In studies performed with methods compliant or comparable to OECD guidelines, no genotoxic activity was observed for Genetic toxicity: DMSO in gene mutation assays in Salmonella typhimurium, an in vitro cytogenetics assay in CHO cells and an in vivo micronucleus assay in rats. With few exceptions, a large battery of additional in vitro and in vivo non-guideline studies confirmed the lack of genotoxic potential.

Reproductive and developmental toxicity: DMSO is not a reproductive toxicant. In a Reproduction/Developmental Toxicity Screening Test performed following the OECD TG 421, the NOAEL for parental toxicity, reproductive performance (mating and fertility) and toxic effects on the progeny was considered to be 1,000 mg/kg/day. In addition, no effect was observed on the estrus cycle, the sperm parameters (count, motility and morphology) and the reproductive organs of male and female rats after a 90-day inhalation exposure to DMSO concentrations up to 2,800 mg/m3. In developmental toxicity studies performed according to the OECD TG 414, oral administration of DMSO to pregnant female rats or rabbits during the period of organogenesis was not teratogenic. The NOAELs for maternal toxicity were 1,000 and 300 mg/kg bw/d in rats and rabbits, respectively, and the NOAELs for embryo/foetotoxicity were 1,000 mg/kg bw/d in both species.

A subchronic rat inhalation study established a NOEL at 200 mg/m3 (0.2 mg/l), the only concentration tested. Extensive monitoring of human patients have shown that DMSO does not affect human renal function. DMSO is a diuretic but no sign of kidney damage has been found in humans or laboratory nimals after repeated DMSO treatment.

The US Public Health Services concluded that DMSO was not a carcinogen and is a safe carrying agent analogous to mineral oil. An 18-month study with rhesus monkeys established an oral NOEL of 3 g/kg/day. No tumors were observed and bone marrow smears from the monkeys that received oral or topical doses of DMSO at up to 9 g/kg/day for 18 months showed no DMSO effects. A 78-week rat study revealed no increases in mortality or tumors and established an oral NOEL of 3.3 g/ kg/day based on hematology and ocular effects. If one considers the rhesus monkey to be the most appropriate model for extrapolation to humans, the oral monkey NOEL of 3 g/kg/day is comparable to an average human (70 kg) consuming approximately 210 g DMSO per day. Continuing research has demonstrated that the ocular effects reported from DMSO treatment of dogs, rabbits, guinea pigs and swine are species-specific and not reproducible in primates, including humans.

Eighty-four humans who received daily topical treatment of 2.6 g DMSO/kg/day for up to 3 months showed no DMSO-related effects beyond occasional skin irritation and garlicky breath and body odor. DMSO is metabolised in humans by oxidation to DMSO2 or by reduction to DMS (dimethylsulfide). DMSO and DMSO2 (dimethylsulfone) are excreted in the urine and feces. DMS is eliminated through the breath and skin with a characteristic garlicky or oyster-like odor. Human excretion of orally administered DMSO is complete within 120 hours, with up to 68 percent as unchanged DMSO and 21-23 percent as DMSO2 excreted in the urine. The rate of renal clearance has been shown to be similar for chronic and singly administered doses regardless of dose concentration. No residual accumulation of DMSO has been reported in humans or lower animals who have received DMSO treatment for protracted periods of time, regardless of route of dose administration. The metabolites of DMSO are DMSO2, which is naturally-occurring at low levels in human urine, and DMS, which is naturally-occurring in plants, the atmosphere, and lakes and oceans. Both of these metabolites are readily excreted from the body. Based on their widespread natural occurrence and ready degradation and/or excretion, the production of these metabolites is not expected to pose any toxicological concern.

DMSO is not considered to be an endocrine disruptor. DMSO is found naturally in the environment, in natural waters and in most foods and feeds. Studies have shown that DMSO applied to plants is metabolised and incorporated into amino acids and other sulfur-containing plant components. Animal and human metabolism studies have shown that DMSO is predominantly eliminated ``as is'' or metabolised to DMSO2 and DMS prior to elimination. Several studies in which different species (i.e. rat, mouse, rabbit, hamster) were administered DMSO at high levels (up to lethal levels) have shown no effect on the time-to-mating or on mating and fertility indices.

DMSO is not mutagenic to Salmonella, Drosophila, and fish cell cultures. Because DMSO is not considered to be mutagenic, it is widely used as a solvent in mutagenicity testing. Although DMSO is bacteriostatic or bactericidal at concentrations of 5-50 percent, there is no evidence that DMSO causes chromosomal aberrations at levels that are not directly toxic to cells. In vivo cytogenetic studies with primates receiving orally or dermally administered DMSO showed no abnormalities in bone marrow smears. There are no documented adverse genetic effects reported as a result of medicinal DMSO uses (including quasi-medicinal uses for treatment of arthritis or sprains and strains). Additionally, no adverse genetic effects have been reported from occupational exposure to DMSO in over 40 years of industrial use.

Reproductive and developmental toxicity. A mouse teratology NOEL of 12 g/kg/day has been established based on research with a 50 percent DMSO solution administered orally. Additional teratogenicity studies of orally administered DMSO to pregnant mice, rats, rabbits and guinea pigs have demonstrated that DMSO is not a teratogen in mammals except at high levels that cause overt maternal toxicity and are coincident with the maximum tolerated dose. The data suggest that DMSO is not teratogenic at low levels regardless of the route of administration. Finally, the teratogenic potential of DMSO is dependent on the route of administration, the dose level and gestation stage at exposure.

The material may be irritating to the eye, with prolonged contact causing inflammation. Repeated or prolonged exposure to irritants may produce conjunctivitis.

The material may cause skin irritation after prolonged or repeated exposure and may produce on contact skin redness, swelling, the production of vesicles, scaling and thickening of the skin.

Section 12 - ECOLOGICAL INFORMATION

Refer to data for ingredients, which follows:
DIMETHYL SULFOXIDE:
DIMETHYL SULFOXIDE-D6:

- ■ DO NOT discharge into sewer or waterways.
- ■ For dimethyl sulfoxide (DMSO)

Half-life (hr) air : 7

Environmental fate:

DMSO is a liquid (density 1.1) with no color but in some cases a light characteristic sulfur odor due to traces of the raw material dimethyl sulfide. DMSO has a melting point of 18.5 C and a boiling point of 189 C (at 1,013 hPa). Its log Kow is of –1.35 (measured). DMSO has a vapor pressure of 0.81 hPa at 25 C and a Henry law's constant of 1.17 10+5 mol.kg-1.atm-1. DMSO is miscible in all proportion with water and with most of the common organic solvents such as alcohols, esters, ketones, ethers, chlorinated solvents and aromatics. DMSO is stable in water and is not expected to volatilize. DMSO Log Koc is estimated to be equal to 0.64. This value suggests that DMSO is mobile in soil. DMSO is not expected to adsorb to suspended solids, sediments and soils. In atmosphere, DMSO is not susceptible to direct photolysis by sunlight. Calculations indicate DMSO half-life values, for reaction with OH radicals, from ca 2 to 6 h

Distribution modeling using Mackay Fugacity model Level III, for equal release in the environment (i.e. 1,000 kg/h), indicates that the main target compartment will be soil (60.4%) and water (39.5%) with the remainder partitioning between air (0.0334%) and sediment (0.0723%).

DMSO is not expected to bioaccumulate in the aquatic environment based on a measured bioconcentration factor lower than 4.

One readily biodegradation test performed following the norm AFNOR NF T 90-312 concluded that DMSO is readily biodegradable. Nevertheless, based on literature data and weight-of-evidence approach, better expectation is to consider DMSO as inherently biodegradable.

Biodegradability): 94% after 27 days (OECD 310D)

Effluents containing DMSO can easily be treated in a biological waste water treatment plant given progressive acclimatisation

– Influent load: 0,04 kg of COD/kg TVSS/ day (0,12kg DMSO / m3 activated sludge /day)

– Aerobic biodegradation (under aerated conditions) produces non polluting sulfates and CO2;

Plant metabolism. The metabolism of DMSO in plants is well understood. Extensive studies have shown that: (1) DMSO is absorbed by plant roots and foliage; (2) translocation of DMSO is primarily upward and associated with the transpirational stream; (3) metabolism of DMSO is primarily occurs in the foliage; (4) DMSO is metabolized to DMSO2 (dimethylsulfone) by oxidation, to volatile DMS (dimethyl sulfide) by reduction and to components that are incorporated into sulfur-containing amino acids and proteins; (5) DMSO does not accumulate in plant tissues; and (6) the amount of residue is dependent on the time since application.

Distribution: When DMSO is applied at up to 5.0 lbs/acre to the edible parts of food and feed crops, dietary exposure to DMSO can be estimated from naturally-occurring DMSO levels in various food and feedstuffs in combination with those from crops harvested 24 hours after DMSO application. Maximum theoretical DMSO residues were 0.5 to 4 ppm in or on fruits and vegetables, up to about 10 ppm in or on small grains, and up to about 40 ppm in or on forage grasses and legumes.

Based on the natural occurrence of DMSO in the environment, its chemical and biological characteristics and little-to- no mobility in soil, DMSO is not expected to significantly increase drinking water exposures to DMSO. DMSO is found in many natural waters but concentrations are dependent on DMSO producing algae and other natural variables.

Any DMSO that may be oversprayed to the soil from applications to crops would be rapidly metabolised by a wide variety of microorganisms, thereby diminishing ground or surface water exposure to DMSO. Additionally, environmental studies have shown little-to-no mobility of DMSO in the soil.

Bioaccumulation/ Bioconcentration: Metabolism studies in humans and animals have shown that DMSO is not bioaccumulative. Since DMSO is naturally-occurring in many if not most fruits, vegetables and grains, is readily metabolized and eliminated, and has low toxicity, there would not be any anticipated increased human risk or adverse effects from DMSO applied to edible parts of plants. Plant-eating animals, including humans, ingest endogenous DMSO on a daily basis throughout their life as part of the normal diet. Ingestion of low-level DMSO residues resulting from agronomic use of DMSO will not increase the body burden of this efficiently metabolised and excreted compound.

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

Ecotoxicity:

Acute toxicity studies, carried out for some of them according to guidelines similar to OECD guidelines, reveal 48-hour EC50's ranging from 24,600 to 58,200 mg/L for daphnid (Daphnia magna) and 96-hour LC50's ranging from 32,300 to 43,000 mg/L for fish according to the species considered (eg. Ictalurus punctatus, Lepomis cyanellus). Modeling calculation for algae indicates 96-hour EC50 value of about 400 mg/l. On this basis DMSO can be considered non-toxic for aquatic compartment

Fish LC50 (96 h): 35200 mg/l
Daphnia EC50: 16250 mg/l (ISO 8192)

Bacteria EC10: 16250 mg/l
Algae EC50 (72 h): 3900 mg/l.
DIMETHYL SULFOXIDE-D6:
DIMETHYL SULFOXIDE:

■ log Kow (Sangster 1997):	- 1.35
■ log Pow (Verschueren 1983):	- 2.03

Ecotoxicity

Ingredient	Persistence: Water/Soil	Persistence: Air	Bioaccumulation	Mobility
dimethyl sulfoxide-D6	HIGH		LOW	HIGH
dimethyl sulfoxide	HIGH		LOW	HIGH

Section 13 - DISPOSAL CONSIDERATIONS

Disposal Instructions

All waste must be handled in accordance with local, state and federal regulations.
¦ Legislation addressing waste disposal requirements may differ by country, state and/ or territory. Each user must refer to laws operating in their area. In some areas, certain wastes must be tracked.
A Hierarchy of Controls seems to be common - the user should investigate:

- Reduction
- Reuse
- Recycling
- Disposal (if all else fails)

This material may be recycled if unused, or if it has not been contaminated so as to make it unsuitable for its intended use. If it has been contaminated, it may be possible to reclaim the product by filtration, distillation or some other means. Shelf life considerations should also be applied in making decisions of this type. Note that properties of a material may change in use, and recycling or reuse may not always be appropriate.
DO NOT allow wash water from cleaning equipment to enter drains. Collect all wash water for treatment before disposal.
In the absence of dissolved oxygen and in the presence of bacteria, a small amount of DMSO can be reduced to DMS (dimethyl sulfide), which produces a nauseating odour at very small concentrations.
These specific conditions occur mainly with DMSO effluents in poorly aerated, non sterile storage tanks or in biological waste treatment plant.

- With spot quantity of DMSO effluents in drums or storage tank, odour can be prevented or eliminated with 0,3% concentration of castor oil based formulation.
- In biological water treatment plant, DMS formation can be inhibited with less than 5 ppm of nitrates such as KNO3. NB: nitrate concentration are permitted by European standards up to 50 ppm in both waste water and drinking water.
- If hydrogen peroxide is already used, with a molar recommended ratio H202/DMSO of 2, oxidation of DMSO leads to stable DMSO2 (dimethyl sulfone).
- Recycle wherever possible or consult manufacturer for recycling options.
- Consult Waste Management Authority for disposal.
- Bury or incinerate residue at an approved site.
- Recycle containers if possible, or dispose of in an authorized landfill.

Section 14 - TRANSPORTATION INFORMATION

NOT REGULATED FOR TRANSPORT OF DANGEROUS GOODS: DOT, IATA, IMDG

Section 15 - REGULATORY INFORMATION

REGULATIONS

dimethyl sulfoxide-D6 (CAS: 2206-27-1) is found on the following regulatory lists;

"Canada Domestic Substances List (DSL)","US DOE Temporary Emergency Exposure Limits (TEELs)"
Regulations for ingredients

dimethyl sulfoxide (CAS: 67-68-5) is found on the following regulatory lists;

"Canada Ingredient Disclosure List (SOR/88-64)","Canada Toxicological Index Service - Workplace Hazardous Materials Information System - WHMIS (English)","Canada Toxicological Index Service - Workplace Hazardous Materials Information System - WHMIS (French)","International Council of Chemical Associations (ICCA) - High Production Volume List","OECD Representative List of High Production Volume (HPV) Chemicals","US AIHA Workplace Environmental Exposure Levels (WEELs)","US DOE Temporary Emergency Exposure Limits (TEELs)","US EPA High Production Volume Program Chemical List","US Toxic Substances Control Act (TSCA) - Inventory"

Section 16 - OTHER INFORMATION

LIMITED EVIDENCE

- Skin contact and/or ingestion may produce health damage*.
- Cumulative effects may result following exposure*.
- Possible respiratory and skin sensitizer*.

* (limited evidence).

Denmark Advisory list for selfclassification of dangerous substances

Substance	CAS	Suggested codes
dimethyl sulfoxide	67- 68- 5	Xn Mut3; R68

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- Classification of the mixture and its individual components has drawn on official and authoritative sources as well as independent review by the Chemwatch Classification committee using available literature references.
A list of reference resources used to assist the committee may be found at:
www.chemwatch.net/references.

- The (M)SDS is a Hazard Communication tool and should be used to assist in the Risk Assessment. Many factors determine whether the reported Hazards are Risks in the workplace or other settings. Risks may be determined by reference to Exposures Scenarios. Scale of use, frequency of use and current or available engineering controls must be considered.

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