

SAFETY DATA SHEET



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DIMETHYL SULFOXIDE

SDS No. M0084

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Name: Dimethyl Sulfoxide

Synonyms: Methyl sulfoxide, DMSO; Sulfinylbis[Methane]

Recommended Use: This product is recommended for laboratory and manufacturing use only. It is not recommended for drug, food or household use.

2. COMPOSITION AND INFORMATION ON INGREDIENTS

<u>Ingredient</u>	<u>CAS No</u>	<u>Percent</u>	<u>Hazardous</u>
Dimethyl Sulfoxide	67-68-5	>99%	Yes

3. HAZARDS IDENTIFICATION



Classification:

Flammable Liquids: GHS Category 4

Eye Irritation: GHS Category 2

Label Elements

Signal Word: WARNING!

Hazard Statements:

H227 – Combustible liquid and vapor

H305 – May be harmful if swallowed and enters airways.

H315 – Causes skin irritation.

H320 – Causes eye irritation.

Precautionary Statements:

P210 – Keep away from heat/ sparks/ open flames/ hot surfaces. No smoking.

P280 – Wear protective gloves/protective clothing/eye protection/face protection.

P303+P361+P353 – If on skin or hair: Remove/take off immediately all contaminated clothing. Rinse skin with water/shower.

Clear focus. Consistent results. Complete confidence.

P501 – Dispose of contents/ container to an approved waste disposal plant.

Emergency Overview:

Readily penetrates skin and may carry other dissolved chemicals into the body. May cause irritation to eyes, skin, and respiratory tract. Prolonged exposure may cause fatigue. Static electricity may accumulate during transfer of material. Combustible liquid and vapor. Hygroscopic. Target Organs: Nervous system, skin, and eyes.

HMIS Rating:

Health – 1 Flammability – 2 Physical Hazard – 0 PPE – User supplied

NOTE: HMIS ratings use a numbering scale that ranges from 0 - 4 to indicate the degree of hazard. A value of zero means the chemical presents no hazard while a value of four indicates a high hazard. These ratings are based on the inherent properties of this chemical under expected conditions of normal use and are not intended to be used in emergency situations. PPE is determined by the user based on their needs and conditions.

4. FIRST-AID MEASURES

Inhalation: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid.

Ingestion: Do not induce vomiting unless directed by medical personnel. If vomiting occurs naturally, have victim lean forward. Never give anything by mouth to an unconscious person. Get medical aid.

Skin Contact: Immediately flush skin with plenty of water for at least 15 minutes. Remove any contaminated clothing and wash before reuse. Get medical attention if irritation persists.

Eye Contact: Check for and remove contact lenses. Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention if irritation persists.

Notes to Physician: Treat symptomatically and supportively.

5. FIRE FIGHTING MEASURES

Flammability: Combustible liquid and vapor. (GHS Class 4)

Auto-ignition Temperature: 215° C (419° F)

Flash Point: 87.8° C (190° F)

Flammable Limits: Lower Limit – 2.6 vol %, Upper Limit – 42 vol %

Products of Combustion: May decompose into irritating and highly toxic gases under fire conditions (Oxides of sulfur, carbon monoxide, hydrogen sulfide).

Specific Fire Hazards: As in any fire, always wear self-contained breathing apparatus in pressure-demand (MSA/NIOSH approved or equivalent), and full protective gear. Use water spray to keep fire exposed containers cool. Approach fire from upwind to avoid hazardous vapors and toxic decomposition products. Vapors are heavier than air and may travel to a source of ignition and flash back. Vapors can spread along the ground and collect in low or confined areas.

Specific Explosion Hazards: None.

Fire Fighting Media: Use dry chemical, carbon dioxide, or water spray.

National Fire Protective Association: Health - 2, Flammability - 2, Reactivity - 0

NOTE: NFPA ratings use a numbering scale that ranges from 0 - 4 to indicate the degree of hazard. A value of zero means the chemical presents no hazard while a value of four indicates a high hazard. They are for use by emergency personnel to address the hazards that are presented by short term, acute exposure to this product under fire, spill, or similar emergencies. Ratings involve data and interpretations that may vary from company to company.

6. ACCIDENTAL RELEASE MEASURES

Absorb spilled liquid with sorbent pads, socks, or other inert material such as vermiculite, sand, or earth. Use spark-proof tools. Provide ventilation to the affected area and remove all ignition sources. Approach the spill from upwind and pick up absorbed material and place it in a suitable container. Always use proper personal protective equipment as described in section 8.

7. HANDLING AND STORAGE

Precautions: Always use proper personal protective equipment as described in section 8. Wash thoroughly after handling. Avoid contact with eyes, skin, and clothing. Remove contaminated clothing and wash before reuse. Empty containers contain product residue (liquid and vapor) and can be dangerous. Use with adequate ventilation. Avoid breathing vapor or mist. Static electricity may accumulate during transfer of material. Do not cut, grind, drill, or weld container.

Storage: Store away from ignition sources. Keep in a tightly closed container. Store in a cool, dry, well-ventilated area away from incompatible substances. Store under nitrogen blanket.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls: Use explosion-proof ventilation equipment. Facilities storing or using the material should be equipped with eyewash station and a safety shower. Use adequate general or local exhaust ventilation to keep airborne concentrations below the permissible exposure limits.

Personal Protection: Wear protective chemical goggles or other appropriate eye protection. Use butyl rubber gloves and protective clothing to prevent skin exposure. A respiratory protection program that meets OSHA 29 CFR 1910.134 and ANSI Z88.2 requirements or European Standard EN 149 must be followed whenever possible. Always use a NIOSH or European Standard EN 149 approved respirator when necessary.

Exposure Limits: None established

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State and Appearance: Clear, colorless liquid.

Odor: Practically odorless

Molecular Formula: $(\text{CH}_3)_2\text{SO}$

Molecular Weight: 78.13

Auto-ignition Temperature: 215° C (419° F)

Flash Point: 87.8° C (190° F)

Flammable Limits: Lower Limit – 2.6 vol %, Upper Limit – 42 vol %

pH: Not available.

Boiling Point: 189° C @ 760 mm Hg

Freezing/Melting Point: 18.4° C

Decomposition Temperature: >189° C.

Specific Gravity: 1.1 g/cm³

Vapor Density (Air=1): 2.7

Vapor Pressure: 0.46 mm Hg @ 20° C.

Evaporation Rate (Butyl acetate = 1): Not available.

Viscosity: 1.1 cp @ 27° C.

Solubility: Soluble alcohols, ethyl ether, and aromatic hydrocarbons.

Conductivity: Conductive; Conductivity = 2×10^5 pS/m; Dielectric Constant = 46.68; Relaxation Time Constant = 2.1×10^{-3} seconds

10. STABILITY AND REACTIVITY

Stability: Stable at room temperature in closed container under normal handling and storage conditions. Hygroscopic (absorbs water or moisture from the air).

Conditions to Avoid: Ignition sources, excess heat, exposure to moist air or water.

Incompatibility with Various Substances: Strong oxidizing agents, organic and mineral acids (sulfur, phosphorous) halides, strong acids, perchloric acid, periodic acid, zinc, steel (in the presence of water), sodium hydride, methylbromide.

Hazardous Decomposition Products: Oxides of sulfur, carbon monoxide, carbon dioxide, formaldehyde, dimethyl sulfide.

Hazardous Polymerization: Will not occur.

11. TOXICOLOGICAL INFORMATION

Routes of Entry: Inhalation, skin absorption, skin contact

Acute Exposure Hazards:

INHALATION HAZARD: Material has a very low vapor pressure at room temperature, so inhalation exposures are not expected unless material is heated or misted.

INGESTION HAZARD: Ingestion may cause gastrointestinal irritation with nausea, vomiting, and diarrhea. May cause central nervous effects. May cause garlic smell on breath and body.

SKIN CONTACT HAZARD: DMSO readily penetrates the skin and may significantly enhance the absorption of other chemicals. Increased absorption of these other chemicals could lead to their increased toxicity. Skin sensitization was not observed in human volunteers or guinea pigs. Non-immunological whealing and flaring have been observed in animals and humans following short-term contact. Skin absorption of DMSO may result in garlic-like breath and body odor, and CNS effects such as headache, nausea, and dizziness. Undiluted DMSO applied topically to mice twice a week for 30 weeks failed to produce dermal injury (EBC - Elf Aquitaine). Skin sensitization has not been reported in hundreds of volunteers participating in a DMSO clinical trial. DMSO's ability to increase absorption of other chemicals is the most significant occupational hazard.

EYE CONTACT HAZARD: May cause mild eye irritation. Two drops of DMSO in the rabbit eye caused a temporary burning sensation and vasodilatation, but concentrations of <50% exhibited no effect. DMSO produced slight erythema of the conjunctive over the first 3 days of the study, and a low level of key scoring was also recorded for chemosis, iritis, and corneal opacity. The degree of eye injury described by these key scores would not result in DMSO being labeled as an eye irritant according to EEC classification (Elf Aquitaine).

Chronic Exposure Hazards: Long-term skin application of 8-90% DMSO has produced CNS effects (such as fatigue, nausea, vomiting, sedation, dizziness, and headache) and dermatitis (such as redness, dryness, and scaling) in volunteers. A garlic-like breath odor has been reported.

Animal Toxicity:

Draize test, rabbit, eye: 100 mg

Draize test, rabbit, eye: 500 mg/24H Mild

Draize test, rabbit, skin: 500 mg/24H Mild

Oral, mouse: LD50 = 7920 mg/kg;

Oral, rat: LD50 = 14,500 mg/kg;

Skin, rabbit: LD50 = 40 g/kg;

Carcinogenicity: Not listed as a carcinogen by ACGIH, IARC, NTP, or CA Prop 65

Epidemiology: No information available.

Teratogenicity: No information available.

Reproductive Effects: No information available.

Mutagenicity: No information available.

Neurotoxicity: No information available.

Other Studies: No information available.

12. ECOLOGICAL INFORMATION

Ecotoxicity:

Fish:LC50 = 25,000 to 43,000 mg/L; 96 Hr;

Water flea Daphnia: EC50 = 24,600 mg/L; 48 Hr;

Algae: Pseudokirchneriella subcapitata (green algae) -: EC50 = 12,000 to 17,000 mg/L; 72 Hr;

Microorganism: Pseudomonas putida: EC50 = 16,000 mg/L; 16 Hr;

Chronic Toxicity to Aquatic Organisms: Algae: EC50 = 3900 to 40,200 mg/L; 14 days

Environmental Fate: Terrestrial: Expected to be mobile in soil due to its high water solubility. Some volatilization from dry soil and surfaces may be expected. Aquatic: DMSO disproportionates in water to dimethyl sulfide and dimethyl sulfone, a reaction catalyzed by light. Atmospheric: Exists primarily in the vapor phase and can be removed by both wet and dry deposition. It will react with photochemically produced hydroxyl radicals with a half-life of about 7 hours. DMSO is very difficult to biodegrade.

Physical: No information available.

Other: Bacterial decomposition of DMSO during waste water treatment can result in the release of dimethyl sulfide, a volatile substance with a strong, disagreeable odor.

13. DISPOSAL CONSIDERATIONS

Material that cannot be saved for recovery or recycling should be managed in an appropriate and approved waste facility. Processing use or contamination of this product may change the waste management options. Waste generators must decide if discarded material is a hazardous waste. State and local disposal regulations may differ from federal disposal definitions found in 40 CFR 261.3. Dispose of container and unused contents in accordance with federal, state and local requirements. This material is neither a "P" listed nor a "U" listed waste under 40 CFR 261.33.

14. TRANSPORT INFORMATION

Not regulated for transportation for less than bulk size container.

- 119 gallons

DOT (US) NA-Number: 1993, Packing group: III
Proper shipping name: Combustible liquid, n.o.s. (Dimethyl sulfoxide)

IMDG Not dangerous goods

IATA Not dangerous goods

15. REGULATORY INFORMATION

US Federal Regulations:

TSCA: CAS# 67-68-5 is listed on the TSCA Inventory.

Health and Safety Reporting List: Not listed.

Chemical Test Rules: Not listed.

Section 12b: Not listed.

TSCA Significant New Use Rule: Does not have an SNUR under TSCA.

CERCLA Hazardous Substances: CAS# 67-68-5 does not have an RQ

SARA Section 302: Does not have a TPQ

SARA Codes: CAS# 67-68-5 – fire

Section 313: DMSO (67-68-5) is not subject to SARA Title III Section 313 reporting requirements.

Clean Air Act: CAS# 67-68-5 is not listed as a hazardous air pollutant (HAP). It is not a Class 1 Ozone Depleter. It is not a Class 2 Ozone Depleter.

Clean Water Act: CAS# 67-68-5 is not listed as a Hazardous Substance. It is not a Priority Pollutant. It is not a Toxic Pollutant.

OSHA: Not considered highly hazardous by OSHA.

US State Regulations:

CAS# 67-68-5 is not on state right-to-know lists.

California Prop 65: California No Significant Risk Level: Not listed

Canada:

DSL/NDL: CAS# 67-68-5 is listed on Canada's DSL list.

WHMIS: This product has a WHMIS classification of D2B. This product has been classified in accordance with hazard criteria of the Controlled Products Regulations and this MSDS contains all the information required by those regulations.

Ingredient Disclosure List: No information available.

DSCL (EEC):

Hazard Symbols: Xi.

Risk Phrases: R36/37/38 – Irritating to eyes, respiratory tract, and skin.

Safety Phrases: S24/25 – Avoid contact with skin and eyes.

WGK (Water Danger/protection): CAS# 67-68-5: 1

16. OTHER INFORMATION

Originally Prepared: 1/1/2006

Last Revised: 6/10/2019 – Updated information in Section 2 (Precautionary Information), Section 4 (First Aid Measures), Section 11 (Toxicological Information), and Section 14 (Transportation Information).

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