SAFETY DATA SHEET according to the OSHA Hazard Communication Standard

Version 6.11
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SECTION 1. IDENTIFICATION

1.1 Product identifiers

Product name : Dimethyl sulfoxide

Product Number : D4540
Brand : Sigma
CAS-No. : 67-68-5

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Inc.
3050 SPRUCE ST
ST. LOUIS MO 63103
UNITED STATES

Telephone : +1 314 771-5765
Fax : +1 800 325-5052

1.4 Emergency telephone number

Emergency Phone # : 800-424-9300 CHEMTREC (USA) +1-703-527-3887 CHEMTREC (International) 24 Hours/day; 7 Days/week

SECTION 2. HAZARDS IDENTIFICATION

GHS classification in accordance with the OSHA Hazard Communication Standard (29 CFR 1910.1200)

Hazards for the product as supplied

Flammable liquids : Category 4

Other hazards

Rapidly absorbed through skin.

GHS label elements

Signal word : Warning

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Hazard statements	:	H227 Combustible liquid.
Precautionary statements	:	**Prevention:** P210 Keep away from heat/ sparks/ open flames/ hot surfaces. No smoking. P280 Wear protective gloves/ eye protection/ face protection. **Response:** P370 + P378 In case of fire: Use dry sand, dry chemical or alcohol-resistant foam to extinguish. **Storage:** P403 + P235 Store in a well-ventilated place. Keep cool. **Disposal:** P501 Dispose of contents/ container to an approved waste disposal plant.

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Substance / Mixture	:	Substance
CAS-No.	:	67-68-5

Components

Chemical name	CAS No./Unique ID	Concentration (% w/w)	Trade secret
dimethyl sulphoxide	67-68-5*	>= 90 - <= 100	-

* Indicates that the identifier is a CAS No.
Actual concentration is withheld as a trade secret

SECTION 4. FIRST AID MEASURES

If inhaled	:	After inhalation: fresh air.
In case of skin contact	:	In case of skin contact: Take off immediately all contaminated clothing. Rinse skin with water/ shower.
In case of eye contact	:	After eye contact: rinse out with plenty of water. Remove contact lenses.
If swallowed	:	After swallowing: make victim drink water (two glasses at most). Consult doctor if feeling unwell.

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Most important symptoms and effects, both acute and delayed	:	The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11
Protection of first-aiders	:	For personal protection see section 8.
Notes to physician	:	No data available

SECTION 5. FIREFIGHTING MEASURES

Suitable extinguishing media	:	Water Foam Carbon dioxide (CO2) Dry powder
Unsuitable extinguishing media	:	For this substance/mixture no limitations of extinguishing agents are given.
Specific hazards during fire fighting	:	Combustible. Vapours are heavier than air and may spread along floors. Forms explosive mixtures with air on intense heating. Development of hazardous combustion gases or vapours possible in the event of fire.
Hazardous combustion products	:	Carbon oxides Sulphur oxides
Specific extinguishing methods	:	No data available
Further information	:	Remove container from danger zone and cool with water. Suppress (knock down) gases/vapours/mists with a water spray jet. Prevent fire extinguishing water from contaminating surface water or the ground water system.

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Special protective equipment for fire-fighters	:	In the event of fire, wear self-contained breathing apparatus.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures	:	Advice for non-emergency personnel: Do not breathe vapours, aerosols. Keep away from heat and sources of ignition. Evacuate the danger area, observe emergency procedures, consult an expert. Advice for emergency responders: For personal protection see section 8.
Environmental precautions	:	Do not let product enter drains.
Methods and materials for containment and cleaning up	:	Cover drains. Collect, bind, and pump off spills. Observe possible material restrictions (see sections 7 and 10). Take up with liquid-absorbent material (e.g. Chemizorb®). Dispose of properly. Clean up affected area.

SECTION 7. HANDLING AND STORAGE

For precautions see section 2.2.

Advice on protection against fire and explosion	:	Keep away from open flames, hot surfaces and sources of ignition. Take precautionary measures against static discharge.
Further information on storage conditions	:	Tightly closed.
Storage class	:	10, Combustible liquids
Recommended storage temperature	:	Recommended storage temperature see product label.
Further information on storage stability	:	Store under inert gas. hygroscopic

SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Ingredients with workplace control parameters

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Components	CAS-No.	Value type (Form of exposure)	Control parameters / Permissible concentration	Basis
dimethyl sulphoxide	67-68-5	TWA	250 ppm	US WEEL

Engineering measures : No data available

Personal protective equipment

Respiratory protection : required when vapours/aerosols are generated. Our recommendations on filtering respiratory protection are based on the following standards: DIN EN 143, DIN 14387 and other accompanying standards relating to the used respiratory protection system.

Recommended Filter type: : Filter A (acc. to DIN 3181) for vapours of organic compounds

The entrepeneur has to ensure that maintenance, cleaning and testing of respiratory protective devices are carried out according to the instructions of the producer. These measures have to be properly documented.

Hand protection

Material	:	Chloroprene
Break through time	:	480 min
Glove thickness	:	0.65 mm
Protective index	:	Full contact
Manufacturer	:	KCL 720 Camapren®
Material	:	Latex gloves
Break through time	:	240 min
Glove thickness	:	0.6 mm
Protective index	:	Splash contact
Manufacturer	:	Lapren® (KCL 706 / Aldrich Z677558, Size M)
Remarks	:	This recommendation applies only to the product stated in the safety data sheet, supplied by us and for the designated use. When dissolving in or mixing with other substances and under conditions deviating from those stated in EN 16523-1 please contact the supplier of CE-approved gloves (e.g. KCL GmbH, D-36124 Eichenzell, Internet: www.kcl.de).

Eye protection : Use equipment for eye protection tested and approved under appropriate government standards

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such as NIOSH (US) or EN 166(EU).
Safety glasses

Hygiene measures : Change contaminated clothing. Wash hands after working with substance.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	:	liquid
Colour	:	clear
Odour	:	odourless
Odour Threshold	:	No data available
pH	:	Not applicable
Melting point/ range	:	61 - 66 °F / 16 - 19 °C
Boiling point/boiling range	:	372 °F / 189 °C
Flash point	:	189 °F / 87 °C (1,013 hPa) Method: ASTM D 93, closed cup
Evaporation rate	:	No data available
Flammability (solid, gas)	:	No data available
Flammability (liquids)	:	No data available
Burning rate	:	No data available
Self-ignition	:	572 - 576 °F / 300 - 302 °C 1,013 hPa
Upper explosion limit / Upper flammability limit	:	28.5 %(V)
Lower explosion limit / Lower flammability limit	:	2.6 %(V)
Vapor pressure	:	0.55 hPa (68 °F / 20 °C)
Relative vapour density	:	2.70 (Air = 1.0)

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Relative density	:	No data available
Density	:	1.1 g/mL
Solubility(ies) Water solubility	: :	 completely miscible
Partition coefficient: n-octanol/water	:	log Pow: -1.35 (68 °F / 20 °C) Bioaccumulation is not expected.
Autoignition temperature	:	572 - 576 °F / 300 - 302 °C (1,013 hPa)
Decomposition temperature	:	> 374 °F / > 190 °C
Viscosity Viscosity, dynamic	: :	 2.14 mPa.s (68 °F / 20 °C)
Viscosity, kinematic	:	No data available
Flow time	:	No data available
Explosive properties	:	No data available
Oxidizing properties	:	none
Surface tension	:	43.5 mN/m, 68 °F / 20 °C
Molecular weight	:	78.13 g/mol
Particle characteristics Particle size	: :	 No data available

SECTION 10. STABILITY AND REACTIVITY

Reactivity	:	Forms explosive mixtures with air on intense heating. A range from approx. 15 Kelvin below the flash point is to be rated as critical.
Chemical stability	:	The product is chemically stable under standard ambient conditions (room temperature) .
Possibility of hazardous reactions	:	Risk of explosion with: acetylidene organic halides perchlorates Acid chlorides nonmetallic halides

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iron(III) compounds
nitrates
fluorides
chlorates
hydrides
perchloric acid
Oxides of phosphorus
Nitric acid
silver compounds
silicon compounds
silanes
acid halides
Exothermic reaction with:
boron compounds
oxyhalogenic compounds
Potassium
sodium
Strong oxidizing agents
phosphorus halides
strong reducing agents
Acid chlorides
Strong acids
silver salt
nitrogen dioxide
Risk of ignition or formation of inflammable gases or vapours with:
potassium permanganate

Conditions to avoid	:	Strong heating.
Incompatible materials	:	No data available
Hazardous decomposition products	:	In the event of fire: see section 5

SECTION 11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - male and female - 28,300 mg/kg
(OECD Test Guideline 401)
LC0 Inhalation - Rat - male and female - 4 h - > 5.33 mg/l - dust/mist

(OECD Test Guideline 403)
LD50 Dermal - Rat - male and female - 40,000 mg/kg
Remarks: (ECHA)

Skin corrosion/irritation
Skin - Rabbit
Result: slight irritation - 4 h

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(OECD Test Guideline 404)

Serious eye damage/eye irritation
Eyes - Rabbit
Result: slight irritation - 24 h
(OECD Test Guideline 405)

Respiratory or skin sensitization
Maximisation Test - Guinea pig
Result: negative
(OECD Test Guideline 406)
Local lymph node assay (LLNA) - Mouse
Result: negative
(OECD Test Guideline 429)

Germ cell mutagenicity
Test Type: Ames test
Test system: Salmonella typhimurium
Metabolic activation: with and without metabolic activation
Method: OECD Test Guideline 471
Result: negative
Test Type: sister chromatid exchange assay
Test system: Chinese hamster ovary cells
Metabolic activation: with and without metabolic activation
Method: OECD Test Guideline 479
Result: negative
Test Type: Mutagenicity (mammal cell test): chromosome aberration.
Test system: Chinese hamster ovary cells
Metabolic activation: with and without metabolic activation
Method: OECD Test Guideline 473
Result: negative

Test Type: Mutagenicity (in vivo mammalian bone-marrow cytogenetic test, chromosomal analysis)
Species: Rat

Application Route: Intraperitoneal
Method: OECD Test Guideline 474
Result: negative

Carcinogenicity

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.

Reproductive toxicity
No data available

Specific target organ toxicity - single exposure
No data available

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Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

11.2 Additional Information

Repeated dose toxicity - Rat - male and female - Oral - 18 Months - No observed adverse effect level - 3,300 mg/kg - Lowest observed adverse effect level - 9,900 mg/kg

Repeated dose toxicity - Monkey - male and female - Dermal - 18 Months - No observed adverse effect level - >= 8,910 mg/kg - Lowest observed adverse effect level - 990 mg/kg

RTECS: PV6210000
Exposure to large amounts can cause:, redness of skin, Itching, burning, sedation, Headache, Nausea, Dizziness
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Eyes - Eye disease - Based on Human Evidence

Eyes - Eye disease - Based on Human Evidence

SECTION 12. ECOLOGICAL INFORMATION

Ecotoxicity

Components:

dimethyl sulphoxide:

Toxicity to fish	:	LC50 (Danio rerio (zebra fish)): > 25,000 mg/l End point: mortality Exposure time: 96 h Test Type: static test Analytical monitoring: yes Method: OECD Test Guideline 203 GLP: yes
Toxicity to daphnia and other aquatic invertebrates	:	EC50 (Daphnia magna (Water flea)): 24,600 mg/l Exposure time: 48 h Test Type: static test Analytical monitoring: yes Method: OECD Test Guideline 202
Toxicity to algae/aquatic plants	:	ErC50 (Pseudokirchneriella subcapitata (green algae)): 17,000 mg/l Exposure time: 72 h Test Type: static test Analytical monitoring: yes Method: OECD Test Guideline 201

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GLP: yes

Toxicity to microorganisms	:	EC50 (activated sludge): 10 - 100 mg/l Exposure time: 30 min Method: ISO 8192

Persistence and degradability

Components:

dimethyl sulphoxide:

Biodegradability	:	aerobic Concentration: 2 mg/l Result: Not readily biodegradable. Biodegradation: 31 % Exposure time: 28 d Method: OECD Test Guideline 301D GLP: yes
Stability in water	:	Degradation half life: 0.12 - 1.2 h (30 °C) pH: 7 Remarks: Hydrolyses readily.

Bioaccumulative potential

Components:

dimethyl sulphoxide:

Partition coefficient: n-octanol/water	:	log Pow: -1.35 (68 °F / 20 °C) Remarks: Bioaccumulation is not expected.

Mobility in soil

No data available

Other adverse effects

Components:

dimethyl sulphoxide:

Results of PBT and vPvB assessment	:	Not persistent, bioaccumulative, and toxic (PBT).

Endocrine disrupting properties

No data available

SECTION 13. DISPOSAL CONSIDERATIONS

Disposal methods

Waste from residues	:	Waste material must be disposed of in accordance with the national and local regulations. Leave chemicals in original containers. No mixing with other waste. Handle uncleaned containers like the product itself.

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SECTION 14. TRANSPORT INFORMATION

International Regulations

IATA-DGR
Not regulated as a dangerous good

IMDG-Code
Not regulated as a dangerous good

Transport in bulk according to IMO instruments

Not applicable for product as supplied.

National Regulations

49 CFR

UN/ID/NA number	:	NA 1993
Proper shipping name	:	Combustible liquid, n.o.s. (dimethyl sulphoxide)
Class	:	Combustible liquid.
Packing group	:	III
Labels	:	None
ERG Code	:	128
Marine pollutant	:	no
Poison Inhalation Hazard	:	No

Special precautions for user

The transport classification(s) provided herein are for informational purposes only, and solely based upon the properties of the unpackaged material as it is described within this Safety Data Sheet. Transportation classifications may vary by mode of transportation, package sizes, and variations in regional or country regulations.

SECTION 15. REGULATORY INFORMATION

CERCLA Reportable Quantity

This material does not contain any components with a CERCLA RQ.

SARA 304 Extremely Hazardous Substances Reportable Quantity

This material does not contain any components with a section 304 EHS RQ.

SARA 302 Extremely Hazardous Substances Threshold Planning Quantity

This material does not contain any components with a section 302 EHS TPQ.

SARA 311/312 Hazards	:	Fire Hazard Chronic Health Hazard
SARA 313	:	This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

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US State Regulations

Massachusetts Right To Know

No components are subject to the Massachusetts Right to Know Act.

Maine Chemicals of High Concern

Product does not contain any listed chemicals

Vermont Chemicals of High Concern

Product does not contain any listed chemicals

Washington Chemicals of High Concern

Product does not contain any listed chemicals

The components of this product are reported in the following inventories:

US TSCA : All substances listed as active on the TSCA inventory

TSCA list

No substances are subject to a Significant New Use Rule.

No substances are subject to TSCA 12(b) export notification requirements.

SECTION 16. OTHER INFORMATION

Full text of other abbreviations

US WEEL : USA. Workplace Environmental Exposure Levels (WEEL)

US WEEL / TWA : 8-hr TWA

AIIC - Australian Inventory of Industrial Chemicals; ASTM - American Society for the Testing of Materials; bw - Body weight; CERCLA - Comprehensive Environmental Response, Compensation, and Liability Act; CMR - Carcinogen, Mutagen or Reproductive Toxicant; DIN - Standard of the German Institute for Standardisation; DOT - Department of Transportation; DSL - Domestic Substances List (Canada); ECx - Concentration associated with x% response; EHS - Extremely Hazardous Substance; ELx - Loading rate associated with x% response; EmS - Emergency Schedule; ENCS - Existing and New Chemical Substances (Japan); ErCx - Concentration associated with x% growth rate response; ERG - Emergency Response Guide; GHS - Globally Harmonised System; GLP - Good Laboratory Practice; HMIS - Hazardous Materials Identification System; IARC - International Agency for Research on Cancer; IATA - International Air Transport Association; IBC - International Code for the Construction and Equipment of Ships carrying Dangerous Chemicals in Bulk; IC50 - Half maximal inhibitory concentration; ICAO - International Civil Aviation Organization; IECSC - Inventory of Existing Chemical Substances in China; IMDG - International Maritime Dangerous Goods; IMO - International Maritime Organisation; ISHL - Industrial Safety and Health Law (Japan); ISO - International Organisation for Standardisation; KECI - Korea Existing Chemicals Inventory; LC50 - Lethal Concentration to 50 % of a test population; LD50 - Lethal Dose to 50% of a test population (Median Lethal Dose); MARPOL - International Convention for the Prevention of Pollution from Ships; MSHA - Mine Safety and Health Administration; n.o.s. - Not Otherwise Specified; NFPA - National Fire Protection Association; NO(A)EC - No Observed (Adverse) Effect Concentration; NO(A)EL - No Observed (Adverse) Effect Level; NOELR - No

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Observable Effect Loading Rate; NTP - National Toxicology Program; NZIoC - New Zealand Inventory of Chemicals; OECD - Organisation for Economic Co-operation and Development; OPPTS - Office of Chemical Safety and Pollution Prevention; PBT - Persistent, Bioaccumulative and Toxic substance; PICCS - Philippines Inventory of Chemicals and Chemical Substances; (Q)SAR - (Quantitative) Structure Activity Relationship; RCRA - Resource Conservation and Recovery Act; REACH - Regulation (EC) No 1907/2006 of the European Parliament and of the Council concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals; RQ - Reportable Quantity; SADT - Self-Accelerating Decomposition Temperature; SARA - Superfund Amendments and Reauthorization Act; SDS - Safety Data Sheet; TCSI - Taiwan Chemical Substance Inventory; TECI - Thailand Existing Chemicals Inventory; TSCA - Toxic Substances Control Act (United States); UN - United Nations; UNRTDG - United Nations Recommendations on the Transport of Dangerous Goods; vPvB - Very Persistent and Very Bioaccumulative

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