

## Chemical Safety Data Sheet MSDS / SDS

## Dimethyl sulfate

Revision Date:2024-03-16 Revision Number:1

## SECTION 1: Identification of the substance/mixture and of the company/undertaking

**Product identifier**

Product name : Dimethyl sulfate  
CBnumber : CB9854316  
CAS : 77-78-1  
EINECS Number : 201-058-1  
Synonyms : Dimethyl sulfate,Dimethyl sulphate

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

Relevant identified uses : For R&D use only. Not for medicinal, household or other use.  
Uses advised against : none

**Company Identification**

Company : Chemicalbook  
Address : Building 1, Huihuang International, Shangdi 10th Street, Haidian District, Beijing  
Telephone : 400-158-6606

## SECTION 2: Hazards identification

**Classification of the substance or mixture**

Acute toxicity - Category 3, Oral  
Skin corrosion, Sub-category 1B  
Skin sensitization, Category 1  
Acute toxicity - Category 2, Inhalation  
Germ cell mutagenicity, Category 2  
Carcinogenicity, Category 1B

**Label elements****Pictogram(s)**

☐☐

Signal word : Danger

**Hazard statement(s)**

H301 Toxic if swallowed  
H314 Causes severe skin burns and eye damage  
H317 May cause an allergic skin reaction

H330 Fatal if inhaled

H341 Suspected of causing genetic defects

H350 May cause cancer

#### **Precautionary statement(s)**

P201 Obtain special instructions before use.

P260 Do not breathe dust/fume/gas/mist/vapours/spray.

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.

P305+P351+P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do.

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P308+P313 IF exposed or concerned: Get medical advice/attention.

P403+P233 Store in a well-ventilated place. Keep container tightly closed.

#### **Prevention**

P264 Wash ... thoroughly after handling.

P270 Do not eat, drink or smoke when using this product.

P260 Do not breathe dust/fume/gas/mist/vapours/spray.

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

P261 Avoid breathing dust/fume/gas/mist/vapours/spray.

P272 Contaminated work clothing should not be allowed out of the workplace.

P271 Use only outdoors or in a well-ventilated area.

P284 [In case of inadequate ventilation] wear respiratory protection.

P203 Obtain, read and follow all safety instructions before use.

#### **Response**

P301+P316 IF SWALLOWED: Get emergency medical help immediately.

P321 Specific treatment (see ... on this label).

P330 Rinse mouth.

P301+P330+P331 IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.

P363 Wash contaminated clothing before reuse.

P304+P340 IF INHALED: Remove person to fresh air and keep comfortable for breathing.

P316 Get emergency medical help immediately.

P305+P351+P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

P302+P352 IF ON SKIN: Wash with plenty of water/...

P333+P317 If skin irritation or rash occurs: Get medical help.

P362+P364 Take off contaminated clothing and wash it before reuse.

P320 Specific treatment is urgent (see ... on this label).

P318 IF exposed or concerned, get medical advice.

#### **Storage**

P405 Store locked up.

P403+P233 Store in a well-ventilated place. Keep container tightly closed.

#### **Disposal**

P501 Dispose of contents/container to an appropriate treatment and disposal facility in accordance with applicable laws and regulations, and product characteristics at time of disposal.

## Other hazards

no data available

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## SECTION 3: Composition/information on ingredients

### Substance

Product name	: Dimethyl sulfate
Synonyms	: Dimethyl sulfate, Dimethyl sulphate
CAS	: 77-78-1
EC number	: 201-058-1
MF	: C <sub>2</sub> H <sub>6</sub> O <sub>4</sub> S
MW	: 126.13

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## SECTION 4: First aid measures

### Description of first aid measures

#### If inhaled

Fresh air, rest. Half-upright position. Artificial respiration may be needed. Refer immediately for medical attention.

#### Following skin contact

Remove contaminated clothes. Rinse skin with plenty of water or shower. Refer immediately for medical attention.

#### Following eye contact

Rinse with plenty of water (remove contact lenses if easily possible). Refer immediately for medical attention.

#### Following ingestion

Rinse mouth. Give one or two glasses of water to drink. Do NOT induce vomiting. Refer immediately for medical attention.

### Most important symptoms and effects, both acute and delayed

Acute: extremely toxic vapors and liquid -- a few whiffs or contact on skin could be fatal. Also acutely toxic if ingested. Delayed effects which are ultimately fatal may also occur. Lethal concentrations as low as 97 ppm/10 min have been reported in humans. DNA inhibition and damage to human somatic cells, and sister chromatid exchange in human fibroblast cells were observed. Delayed appearance of symptoms may permit unnoticed exposure to lethal quantities. (EPA, 1998)

### Indication of any immediate medical attention and special treatment needed

IN ALL CASES CONSULT A DOCTOR! INHALATION: Fresh air, rest. Half-upright position. Artificial respiration may be needed. Refer for medical attention. SKIN: Remove contaminated clothes. Rinse and then wash skin with water and soap. Refer for medical attention. EYES: First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor. INGESTION: Rinse mouth. Give plenty of water to drink. Refer for medical attention immediately.

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## SECTION 5: Firefighting measures

### Extinguishing media

Water, foam, carbon dioxide, dry chemical .

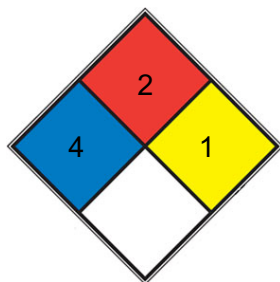
## Specific Hazards Arising from the Chemical

Material is normally stable even under fire exposure conditions and is not hazardously reactive with water. It is incompatible with strong oxidizers and strong ammonia solutions. (EPA, 1998)

### Advice for firefighters

Use powder, foam, carbon dioxide, water spray.

### NFPA 704



HEALTH 4 Very short exposure could cause death or major residual injury (e.g. hydrogen cyanide, phosgene, methyl isocyanate, [hydrofluoric acid](#))

FIRE 2 Must be moderately heated or exposed to relatively high ambient temperature before ignition can occur and multiple finely divided suspended solids that do not require heating before ignition can occur. Flash point between 37.8 and 93.3 °C (100 and 200 °F). (e.g. diesel fuel, [sulfur](#))

REACT 1 Normally stable, but can become unstable at elevated temperatures and pressures (e.g. [propene](#))

SPEC.  
 HAZ.

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## SECTION 6: Accidental release measures

### Personal precautions, protective equipment and emergency procedures

Evacuate danger area! Consult an expert! Personal protection: complete protective clothing including self-contained breathing apparatus. Ventilation. Do NOT let this chemical enter the environment. Collect leaking liquid in sealable containers. Absorb remaining liquid in dry sand or inert absorbent. Then store and dispose of according to local regulations.

### Environmental precautions

Evacuate danger area! Consult an expert! Personal protection: complete protective clothing including self-contained breathing apparatus. Ventilation. Do NOT let this chemical enter the environment. Collect leaking liquid in sealable containers. Absorb remaining liquid in dry sand or inert absorbent. Then store and dispose of according to local regulations.

### Methods and materials for containment and cleaning up

Spillage should only be dealt with by trained personnel wearing full protective clothing, a full-face mask, and positive-pressure breathing apparatus. Soda ash or 3% ammonia solution may be applied to liquid spills. Sprays of 3% ammonia solution may be used to "knock down" the vapor over spillages. After complete neutralization, spillages may be washed away... If dimethyl sulfate has entered a watercourse ... or contaminated soil or vegetation, advise the police and public authorities.

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## SECTION 7: Handling and storage

### Precautions for safe handling

NO open flames. Above 83°C use a closed system and ventilation. Handling in a well ventilated place. Wear suitable protective clothing. Avoid contact with skin and eyes. Avoid formation of dust and aerosols. Use non-sparking tools. Prevent fire caused by electrostatic discharge steam.

### Conditions for safe storage, including any incompatibilities

Separated from food and feedstuffs and incompatible materials. See Chemical Dangers. Cool. Dry. Well closed. Ventilation along the floor. Store in an area without drain or sewer access. PRECAUTIONS FOR "CARCINOGENS": Storage site should be as close as practicable to lab in which carcinogens are to be used, so that only small quantities required for ... expt need to be carried. Carcinogens should be kept in only one section of cupboard, an explosion-proof refrigerator, or freezer (depending on chemico-physical properties ...) that bears appropriate label. An inventory ... should be kept, showing quantity of carcinogen & date it was acquired. Facilities for dispensing ... should be contiguous to storage area. Chemical Carcinogens

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## SECTION 8: Exposure controls/personal protection

### Control parameters

#### Occupational Exposure limit values

TLV: 0.1 ppm as TWA; (skin); A3 (confirmed animal carcinogen with unknown relevance to humans). MAK: skin absorption (H); carcinogen category: 2

#### Biological limit values

no data available

### Exposure controls

Ensure adequate ventilation. Handle in accordance with good industrial hygiene and safety practice. Set up emergency exits and the risk-elimination area.

### Individual protection measures

#### Eye/face protection

Wear face shield or eye protection in combination with breathing protection.

#### Skin protection

Protective gloves. Protective clothing.

#### Respiratory protection

Use ventilation, local exhaust or breathing protection.

#### Thermal hazards

no data available

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## SECTION 9: Physical and chemical properties

### Information on basic physicochemical properties

Physical state	Liquid
Colour	Clear colorless
Odour	Essentially odorless
Melting point/freezing point	63°C(lit.)
Boiling point or initial boiling point and boiling range	188°C(lit.)
Flammability	Class IIIA Combustible Liquid: Fl.P. at or above 140°F and below 200°F.
Lower and upper explosion limit/flammability limit	no data available
Flash point	83°C
Auto-ignition temperature	923°F
Decomposition temperature	188°C
pH	no data available
Kinematic viscosity	no data available
Solubility	ethanol: 0.26 g/mL, clear, colorless
Partition coefficient n-octanol/water	log Kow = 0.16 (est)
Vapour pressure	0.7 mm Hg ( 25 °C)
Density and/or relative density	1.333g/mL at 25°C(lit.)
Relative vapour density	4.3 (vs air)
Particle characteristics	no data available

## SECTION 10: Stability and reactivity

### Reactivity

NIOSH considers dimethyl sulfate to be a potential occupational carcinogen.

Decomposes on heating and on burning. This produces toxic fumes including sulfur oxides. The solution is a medium strong acid. Reacts with water. This produces sulfuric acid. This generates heat. Reacts violently with concentrated aqueous ammonia, bases, acids and strong oxidants. This generates fire and explosion hazard.

### Chemical stability

Stable at room temperature.

### Possibility of hazardous reactions

MODERATE, WHEN EXPOSED TO HEAT OR FLAME. Pure DIMETHYL SULFATE and concentrated aqueous ammonia react extremely violently with one another, as is the case for tertiary organic bases, [NFPA 491M, 1991]. Dimethyl sulfate ignites in contact with unheated barium chlorite, due to the rapid formation of unstable methyl chlorite. The product of methylating an unnamed material at 110° C was allowed to remain in a reactor for 80 min. before the reactor exploded. This involved a sulfur ester such as dimethyl sulfate, [MCA Case History No. 1786].

### Conditions to avoid

no data available

### Incompatible materials

Can react with oxidizing materials.

### **Hazardous decomposition products**

Note: Decomposes in water to sulfuric acid; corrosive to metals.

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## **SECTION 11: Toxicological information**

### **Acute toxicity**

- Oral: LD50 Mouse oral 140 mg/kg bw
- Inhalation: LC50 Guinea pig inhalation 167 mg/cu m (32 ppm)/60 min.
- Dermal: no data available

### **Skin corrosion/irritation**

no data available

### **Serious eye damage/irritation**

no data available

### **Respiratory or skin sensitization**

no data available

### **Germ cell mutagenicity**

no data available

### **Carcinogenicity**

Evaluation: There is inadequate evidence for the carcinogenicity in humans of dimethyl sulfate. There is sufficient evidence for the carcinogenicity in experimental animals of dimethyl sulfate. Overall evaluation: Dimethyl sulfate is probably carcinogenic to humans (Group 2A). In making the overall evaluation, the Working Group took into consideration that dimethyl sulfate is a potent genotoxic chemical which can directly alkylate DNA both in vitro and in vivo.

### **Reproductive toxicity**

No information is available on the reproductive or developmental effects of dimethyl sulfate in humans. Dimethyl sulfate has been reported to produce tumors in the offspring of rats exposed intravenously.

### **STOT-single exposure**

The substance is corrosive to the eyes, skin and respiratory tract. Corrosive on ingestion. Inhalation may cause lung oedema. See Notes. The substance may cause effects on the liver and kidneys. This may result in impaired functions. Exposure far above the OEL could cause death. The effects may be delayed. Medical observation is indicated.

### **STOT-repeated exposure**

Repeated or prolonged inhalation of the vapour may cause effects on the lungs. This substance is probably carcinogenic to humans. Repeated or prolonged contact may cause skin sensitization.

### **Aspiration hazard**

A harmful contamination of the air can be reached rather quickly on evaporation of this substance at 20°C.

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## SECTION 12: Ecological information

### Toxicity

Toxicity to fish: LC50; Species: Lepomis macrochirus (Bluegill, length 33-75 mm); Conditions: freshwater, static, 23 deg C, pH 7.6-7.9, hardness 55 mg/L CaCO<sub>3</sub>; Concentration: 7500 ug/L for 96 hr /99% purity

Toxicity to daphnia and other aquatic invertebrates: no data available

Toxicity to algae: no data available

Toxicity to microorganisms: no data available

### Persistence and degradability

no data available

### Bioaccumulative potential

Based upon the hydrolysis of dimethyl sulfate in aqueous environments(1), bioconcentration is not expected to be a primary removal process in aquatic systems(SRC).

### Mobility in soil

Based upon the hydrolysis of dimethyl sulfate in aqueous environments(1), adsorption to soil and leaching are not expected to be important processes(SRC).

### Other adverse effects

no data available

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## SECTION 13: Disposal considerations

### Disposal methods

#### Product

The material can be disposed of by removal to a licensed chemical destruction plant or by controlled incineration with flue gas scrubbing. Do not contaminate water, foodstuffs, feed or seed by storage or disposal. Do not discharge to sewer systems.

#### Contaminated packaging

Containers can be triply rinsed (or equivalent) and offered for recycling or reconditioning. Alternatively, the packaging can be punctured to make it unusable for other purposes and then be disposed of in a sanitary landfill. Controlled incineration with flue gas scrubbing is possible for combustible packaging materials.

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## SECTION 14: Transport information

### UN Number

ADR/RID: UN1595 (For reference only, please check.)

IMDG: UN1595 (For reference only, please check.)

IATA: UN1595 (For reference only, please check.)



### **UN Proper Shipping Name**

ADR/RID: DIMETHYL SULPHATE (For reference only, please check.)

IMDG: DIMETHYL SULPHATE (For reference only, please check.)

IATA: DIMETHYL SULPHATE (For reference only, please check.)

### **Transport hazard class(es)**

ADR/RID: 6.1 (For reference only, please check.)

IMDG: 6.1 (For reference only, please check.)

IATA: 6.1 (For reference only, please check.)

### **Packing group, if applicable**

ADR/RID: I (For reference only, please check.)

IMDG: I (For reference only, please check.)

IATA: I (For reference only, please check.)

### **Environmental hazards**

ADR/RID: No

IMDG: No

IATA: No

### **Special precautions for user**

no data available

### **Transport in bulk according to IMO instruments**

no data available

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## SECTION 15: Regulatory information

### **Safety, health and environmental regulations specific for the product in question**

#### **European Inventory of Existing Commercial Chemical Substances (EINECS)**

Listed.

#### **EC Inventory**

Listed.

#### **United States Toxic Substances Control Act (TSCA) Inventory**

Listed.

#### **China Catalog of Hazardous chemicals 2015**

Listed.

#### **New Zealand Inventory of Chemicals (NZIoC)**

Listed.

#### **PICCS**

Listed.

#### **Vietnam National Chemical Inventory**

Listed.

#### **IECSC**

Listed.

#### **Korea Existing Chemicals List (KECL)**

Listed.

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## SECTION 16: Other information

### **Abbreviations and acronyms**

CAS: Chemical Abstracts Service

ADR: European Agreement concerning the International Carriage of Dangerous Goods by Road

RID: Regulation concerning the International Carriage of Dangerous Goods by Rail

IMDG: International Maritime Dangerous Goods

IATA: International Air Transportation Association

TWA: Time Weighted Average

STEL: Short term exposure limit

LC50: Lethal Concentration 50%

LD50: Lethal Dose 50%

EC50: Effective Concentration 50%

### **References**

IPCS - The International Chemical Safety Cards (ICSC), website: <http://www.ilo.org/dyn/icsc/showcard.home>

HSDB - Hazardous Substances Data Bank, website: <https://toxnet.nlm.nih.gov/newtoxnet/hsdb.htm>

IARC - International Agency for Research on Cancer, website: <http://www.iarc.fr/>

eChemPortal - The Global Portal to Information on Chemical Substances by OECD, website: [http://www.echemportal.org/echemportal/index?pageID=0&request\\_locale=en](http://www.echemportal.org/echemportal/index?pageID=0&request_locale=en)

CAMEO Chemicals, website: <http://cameochemicals.noaa.gov/search/simple>

ChemIDplus, website: <http://chem.sis.nlm.nih.gov/chemidplus/chemidlite.jsp>

ERG - Emergency Response Guidebook by U.S. Department of Transportation, website: <http://www.phmsa.dot.gov/hazmat/library/erg>

Germany GESTIS-database on hazard substance, website: <http://www.dguv.de/ifa/gestis/gestis-stoffdatenbank/index-2.jsp>

ECHA - European Chemicals Agency, website: <https://echa.europa.eu/>

### **Other Information**

Commercial dimethyl sulfate may contain trace amounts of sulfuric acid. Depending on the degree of exposure, periodic medical examination is suggested. The symptoms of lung oedema often do not become manifest until a few hours have passed and they are aggravated by physical effort. Rest and medical observation are therefore essential. Immediate administration of an appropriate inhalation therapy by a doctor, or by an authorized person, should be considered. There is no odour warning even when toxic concentrations are present. Do NOT take working clothes home.

#### **Disclaimer:**

The information in this MSDS is only applicable to the specified product, unless otherwise specified, it is not applicable to the mixture of this product and other substances. This MSDS only provides information on the safety of the product for those who have received the appropriate professional training for the user of the product. Users of this MSDS must make independent judgments on the applicability of this SDS. The authors of this MSDS will not be held responsible for any harm caused by the use of this MSDS.