DIMETHYL SULPHATE

Section 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME
DIMETHYL SULPHATE

OTHER NAMES

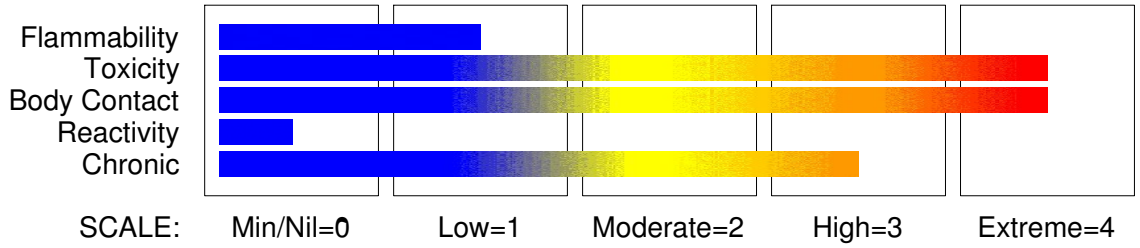
C2-H6-O4-S, (CH3)2-SO4, (CH3-O)2-SO2, "dimethyl sulphate", DMS, "methyl sulfate", "sulfuric acid, dimethyl ester", "dimethyl monosulfate",

PROPER SHIPPING NAME
DIMETHYL SULPHATE

PRODUCT USE
Methylating agent used in the manufacture of dyes and organic chemicals.
Methylating agent for amines and phenols. In polyurethane-based adhesives.
Has been used as a war-gas since it carries no sensing/ warning properties.
Also used as a solvent in the separation of mineral oils.
Intermediate in the manufacture of many pharmaceuticals and pesticides.

SUPPLIER
Company: S D FINE- CHEM LIMITED
Address:
315- 317, T.V. INDUSTRIAL ESTATE,
248, WORLI,
MUMBAI- 400030.INDIA.
technical@sdfine.com
Telephone: 91- 22- 24959898
Telephone: 91- 22- 24959899
Fax: 91- 22- 24937232

HAZARD RATINGS



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Section 2 - HAZARDS IDENTIFICATION

GHS Classification

Acute Toxicity (Inhalation) Category 1
Acute Toxicity (Oral) Category 3
Carcinogen Category 1B
Flammable Liquid Category 4
Skin Corrosion/Irritation Category 1C
Skin Sensitizer Category 1

EMERGENCY OVERVIEW

HAZARD

DANGER
Determined by using GHS criteria:
H227 H330 H301 H317 H350 H314
Combustible Liquid
Fatal if inhaled
Toxic if swallowed
May cause allergic skin reaction
May cause CANCER
Causes severe skin burns and eye damage

PRECAUTIONARY STATEMENTS

Prevention

Avoid breathing dust/fume/gas/mist/vapours/spray.
Wear protective gloves/clothing and eye/face protection.
Wear respiratory protection.
Do not breathe dust/fume/gas/mist/vapours/spray.
Use only outdoors or in a well ventilated area.
Wash thoroughly after handling.
Do not handle until all safety precautions have been read and understood.
Use personal protective equipment as required.
Obtain special instructions before use.
Do not breathe dust or mist.
Contaminated clothing should not be allowed out of the workplace.
Keep away from flames and hot surfaces.
Wash hands thoroughly after handling.
Do not eat, drink or smoke when using this product.
Use explosion-proof electrical/ventilating/lighting/equipment

Response

IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.

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IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
Keep container tightly closed.
If skin irritation or rash occurs, seek medical advice/attention.
Wash contaminated clothing before reuse.
Absorb spillage to prevent material damage.
If on skin or hair: remove/take off immediately all contaminated clothing. Rinse with water/shower.
If exposed or concerned: Get medical attention advice.
IF ON SKIN: Gently wash with plenty of soap and water.
Specific treatment: refer to Label or MSDS.
Immediately call a POISON CENTER or doctor/physician.
IF INHALED: Remove to fresh air and keep at rest in a position comfortable for breathing.
IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician.

Storage

Store locked up.
Store away from other materials
Store in a corrosive resistant container with a resistant inliner.

Disposal

Dispose of contents and container in accordance with relevant legislation.

Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS

NAME	CAS RN	%
dimethyl sulfate	77-78-1	100.0
hydrolysis produces		
methanol	67-56-1	
sulfuric acid	7664-93-9	

Section 4 - FIRST AID MEASURES

SWALLOWED

Poison Information Centres in each State capital city can provide additional assistance.

EYE

If this product comes in contact with the eyes:
· Immediately hold eyelids apart and flush the eye continuously with 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.
· Continue flushing until advised to stop by the Poisons Information Centre or a doctor, or for at least 15 minutes.
· Transport to hospital or doctor without delay.
· Removal of contact lenses after an eye injury should only be undertaken by skilled personnel.

SKIN

If skin or hair contact occurs:
· Immediately flush body and clothes with large amounts of water, using safety shower if available.

continued...

· Quickly remove all contaminated clothing, including footwear.
· Wash skin and hair with running water. Continue flushing with water until advised to stop by the Poisons Information Centre.
· Transport to hospital, or doctor.
In case of burns:
· Quickly immerse affected area in cold running water for 10 to 15 minutes.
· Bandage lightly with a sterile dressing. Treat for shock if required.
· Lay patient down. Keep warm and rested.
· Transport to hospital, or doctor.

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.

NOTES TO PHYSICIAN

International Programme on Chemical Safety (IPCS); WHO, Geneva.
In the event of suspected inhalation of vapour, even in the absence of any symptoms, patients should be kept resting quietly under clinical observation for at least 12 hours. The eye should be irrigated, even if apparently unaffected, with a 2% solution of sodium bicarbonate for a full 15 minutes. Eye irrigation should be repeated if any redness develops.
Oxygen may be administered if there is breathing difficulty. Arrangements should be made for the possible effected patient to be transferred to the nearest centre equipped for the treatment of pulmonary oedema, the support of patients with major organ failure, and circulatory collapse.
No specific antidote is known. In case of contamination of the body surface, irrigate affected eyes and skin burns with a 2% solution of sodium bicarbonate in water and treat conventionally. Hydrocortisone or other steroid drops may be useful.
With inhalation exposure, the administration of high doses of methyl prednisolone (30 mg/kg body weight), by slow intravenous injection) or the administration of other steroids (e.g. beclometasone dipropionate) by metered-dose aerosol has been reported to reduce the incidence of exudative pulmonary oedema and subsequent pulmonary fibrosis. The prophylactic use of steroids after exposure, but before signs and symptoms appear may be of value in reducing pulmonary damage by dimethyl sulfate.
An early chest X-ray may be useful for comparison with a later film in the event of the development of pulmonary oedema. Oral or aerosol bronchodilators (e.g. salbutamol) may be of value if there if there is bronchospasm. Oxygen and dehumidification are the main lines of treatment for mild pulmonary oedema, diuretics, opiates, and theophyllines do not have a role, since the condition is exudative rather than transudative.
In extreme cases, intermittent positive-pressure ventilation may be necessary. Prophylactic antibiotics are generally indicated, since secondary bacterial infection of the airways often occurs.
If there is oesophageal, opthalmic, or urinary tract pain, analgesics may be given, but those that are respiratory depressants or topical irritants should be avoided. Oral medication should be avoided if there is nausea or upper abdominal pain.
Heart rate, blood pressure, fluid balance, arterial blood gases, and liver

continued...

and renal function should be monitored, and support should be given on general lines if there is any signs of circulatory, liver or renal failure.
A detailed neurological and opthalmological assessment should be made as early as possible and during the recovery phase.
Where no symptoms or signs have appeared within 12 hours, the patient may be discharged from observation, but should be warned to return if symptoms develop.
As dimethyl sulfate can be metabolised to methanol, there is the theoretically possibility of superadded methanol poisoning, although this has never been reported in human poisoning cases. If methanol poisoning is suspected, the serum methanol level can be determined and metabolic acidosis corrected with sodium bicarbonate. Specific treatment for methanol poisoning should be given if indicated.
A particularly difficult situation which may arise when symptoms that could be the result of dimethyl sulfate overexposure, but could equally well be an incipient upper respiratory tract infection or conjunctivitis, occur in workers in the plant without a history of exposure. Such people may seek advice because they know that exposure may be imperceptible. In such situations, the correct course of action will depend on a careful history of presenting the complaints, of the occurrence of similar symptoms in other members of the household or working group, of the timing of the onset of symptoms in relation to the last work-period, and of ant abnormal conditions or events in the plant that could have led to the exposure. Medical and nursing staff who know their employees may be able to take personality factors into account.
It may be advisable for persons with pre-existing respiratory or liver disease to be excluded from work with dimethyl sulfate. Preplacement examinations should also document the visual fields and the colour vision status of the employee or recruit.
Wherever measured exposures are close to the occupational exposure limit or there is dependence on personal protection to limit exposure, it is wise to undertake regular health surveillance, including tests of liver and pulmonary function, colour vision, and visual fields.

Section 5 - FIRE FIGHTING MEASURES

EXTINGUISHING MEDIA
Foam.
Dry chemical powder.
Carbon dioxide.
Water spray or fog.

FIRE FIGHTING
Combustible liquid.
Clear area of personnel.
Alert Fire Brigade 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.
· Consider evacuation (or protect in place).
Cool fire exposed containers with water spray from a protected location.
If safe to do so, remove containers from path of fire.

continued...

Use fire fighting procedures suitable for surrounding area.

FIRE/EXPLOSION HAZARD
Combustible liquid.
Moderate fire hazard when exposed to heat, flame or oxidisers.
Reacts vigorously with oxidising agents.
Decomposes on heating and produces toxic fumes of carbon monoxide (CO) and sulfur oxides (SOx).
Heating may cause expansion or decomposition leading to violent rupture of containers.
Not liable to spontaneous heating.

Personal Protective Equipment
Breathing apparatus.
Gas tight chemical resistant suit.
Limit exposure duration to 1 BA set 30 mins.

Section 6 - ACCIDENTAL RELEASE MEASURES

EMERGENCY PROCEDURES

MINOR SPILLS
Clean up all spills immediately.
Avoid breathing vapours and contact with skin and eyes.
Increase ventilation.
Use soda ash or slaked lime to neutralise.
Wash spill area with large quantities of water.
If product enters drains, waterways or watercourses, flush at least ten (10) times the volume of water to the drain.

MAJOR SPILLS
Clear area of personnel and move upwind.
Alert Fire Brigade and tell them location and nature of hazard.
Increase ventilation.
· Wear full body protective clothing with breathing apparatus.
· Prevent, by any means available, spillage from entering drains or water courses.
· Consider evacuation (or protect in place).
Stop leak if safe to do so.
Recover liquid and place in labelled, sealable container.
Neutralise remaining product with soda ash or slaked lime which is slurried with water.
Wash spill area with large quantities of water.
After clean up operations, decontaminate protective gear and equipment by soaking in 5% soda ash solution for at least 24 hours. Rinse and dry.

EMERGENCY RESPONSE PLANNING GUIDELINES (ERPG)
The maximum airborne concentration below which it is believed that nearly all individuals could be exposed for up to one hour WITHOUT experiencing or developing

life-threatening health effects is:
dimethyl sulfate 7 ppm

irreversible or other serious effects or symptoms which could impair an individual's ability to take protective action is:

continued...

dimethyl sulfate 1.0 ppm

other than mild, transient adverse effects without perceiving a clearly defined odour is:
dimethyl sulfate 1.0 ppm

The threshold concentration below which most people will experience no appreciable risk of health effects:
dimethyl sulfate 1.0 ppm

American Industrial Hygiene Association (AIHA)

Ingredients considered according to the following cutoffs

Very Toxic (T+)	>= 0.1%	Toxic (T)	>= 3.0%
R50	>= 0.25%	Corrosive (C)	>= 5.0%
R51	>= 2.5%		
else	>= 10%		

where percentage is percentage of ingredient found in the mixture

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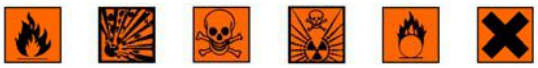
SAFE STORAGE WITH OTHER CLASSIFIED CHEMICALS



X	X	+	X	X	+

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

Personal Protective Equipment advice is contained in Section 8 of the MSDS.

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.
· Avoid contact with moisture.
· 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. Launder contaminated clothing before re-use.
· 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 are maintained.

SUITABLE CONTAINER

· Check that containers are clearly labelled.

continued...

Store in metal drums or safety cans.
Glass container.

STORAGE INCOMPATIBILITY

Segregate from oxidising agents, aluminium, ammonia, ammonium hydroxide (NH4OH), sodium azide (NaN3), and magnesium. In the presence of moisture, the substance becomes corrosive to most metals.

STORAGE REQUIREMENTS

Store in a cool, dry place.
Store in a well-ventilated area.
Store away from incompatible materials.
Store away from foodstuff containers.
DO NOT store in pits, depressions, basements or areas where vapours may be trapped.
Protect containers against physical damage.
Keep containers securely sealed.
Check regularly for spills and leaks.

Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

EXPOSURE CONTROLS

The following materials had no OELs on our records

• dimethyl sulfate:	CAS:77- 78- 1 CAS:139443- 72- 4 CAS:62086- 97- 9 CAS:98478- 67- 2
• methanol:	CAS:58456- 46- 5 CAS:67- 56- 1 CAS:19710- 56- 6 CAS:7263- 60- 7 CAS:6853- 31- 2 CAS:79825- 55- 1 CAS:253142- 14- 2 CAS:54841- 71- 3
• sulfuric acid:	CAS:7664- 93- 9

EMERGENCY EXPOSURE LIMITS

Material	Revised IDLH Value (mg/m3)	Revised IDLH Value (ppm)
dimethyl sulfate		7
methanol		6, 000
sulfuric acid	15	

ODOUR SAFETY FACTOR (OSF)

OSF=2 (dimethyl sulfate)
Exposed individuals are NOT reasonably expected to be warned, by smell, that the Exposure Standard is being exceeded.
Odour Safety Factor (OSF) is determined to fall into either Class C, D or E.
The Odour Safety Factor (OSF) is defined as:
OSF= Exposure Standard (TWA) ppm/ Odour Threshold Value (OTV) ppm
Classification into classes follows:

Class	OSF	Description
A	550	Over 90% of exposed individuals are aware by smell that the Exposure Standard (TLV- TWA for example) is being reached, even when distracted by working activities

continued...

B	26- 550	As " A" for 50- 90% of persons being distracted
C	1- 26	As " A" for less than 50% of persons being distracted
D	0.18- 1	10- 50% of persons aware of being tested perceive by smell that the Exposure Standard is being reached
E	<0.18	As " D" for less than 10% of persons aware of being tested

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MATERIAL DATA

NOTE: Detector tubes for dimethyl sulfate, measuring in excess of 0.005 ppm are commercially available.
The TLV-TWA is thought to furnish a margin of safety below the concentration producing toxic effects in rats. Control of concentrations at this level can be achieved by exercise of reasonable care and are thought to substantially reduce the risk of cancer mortality.

INGREDIENT DATA

METHANOL:

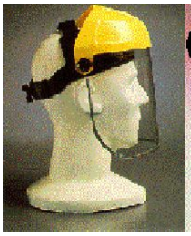
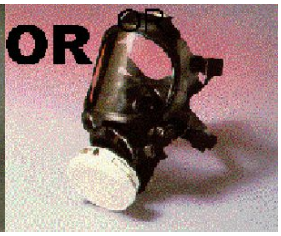
Odour Threshold Value: 4.2-5960 ppm (detection), 53.0-8940 ppm (recognition)
NOTE: Detector tubes for methanol, measuring in excess of 50 ppm, are commercially available.
Exposure at or below the recommended TLV-TWA is thought to substantially reduce the significant risk of headache, blurred vision and other ocular and systemic effects.

SULFURIC ACID:

NOTE: Detector tubes for sulfuric acid, measuring in excess of 1 mg/m3, are commercially available.
Based on controlled inhalation studies the TLV-TWA is thought to be protective against the significant risk of pulmonary irritation and incorporates a margin of safety so as to prevent injury to the skin and teeth seen in battery workers acclimatised to workplace concentrations of 16 mg/m3. Experimental evidence in normal unacclimated humans indicates the recognition, by all subjects, of odour, taste or irritation at 3 mg/m3 or 5 mg/m3. All subjects reported these levels to be objectionable but to varying degrees.

PERSONAL PROTECTION



EYE

· Chemical goggles.
· Full face shield.

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DO NOT wear contact lenses.
· Eyewash unit.

HANDS/FEET
Rubber gloves.
Impervious gloves.
Rubber boots.

OTHER
Rubber apron.
· Impervious protective clothing.
Ensure there is ready access to a safety shower.

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	BEAX- AUS P	-
1000	50	-	BEAX- AUS P
5000	50	Airline *	-
5000	100	-	BEAX- 2 P
10000	100	-	BEAX- 3 P
	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.
For further information consult
your
Occupational Health and Safety Advisor.

ENGINEERING CONTROLS
Air-line hood.
If risk of overexposure exists, wear SAA approved respirator.
Provide adequate ventilation in warehouse or closed storage areas.

Section 9 - PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE
Clear, colourless to water-white toxic liquid. Regarded as being extremely hazardous having no odour and hence giving no WARNING of exposure.
Soluble in alcohol, ether, dioxane, acetone, and aromatic hydrocarbons.
Sparingly soluble in carbon disulfide and aliphatic hydrocarbons.
Slightly soluble in water, hydrolysing to soluble methanol, sulfuric acid.

PHYSICAL PROPERTIES
Liquid.
Does not mix with water.

continued...

Section 9 - PHYSICAL AND CHEMICAL PROPERTIES

Sinks in water.
Corrosive.
Toxic or noxious vapours/gas.

Molecular Weight: 126.13
Melting Range (°C): - 31.8
Solubility in water (g/L): Partly miscible
pH (1% solution): <7
Volatile Component (%vol): 100
Relative Vapour Density (air=1): 4.35
Lower Explosive Limit (%): Not available.
Autoignition Temp (°C): 188
State: Liquid

Boiling Range (°C): 188.8 decomposes
Specific Gravity (water=1): 1.328 @ 20 C
pH (as supplied): Not applicable
Vapour Pressure (kPa): 0.072 @ 20 C
Evaporation Rate: Not available
Flash Point (°C): 84.4
Upper Explosive Limit (%): Not available.
Decomposition Temp (°C): Not available
Viscosity: Not available

log Kow (Prager 1995): 0.032
log Kow: -0.82- -0.66

Section 10 - CHEMICAL STABILITY AND REACTIVITY INFORMATION

CONDITIONS CONTRIBUTING TO INSTABILITY

Presence of elevated temperatures.
Presence of incompatible materials.
Decomposes in the presence of moisture to produce corrosive acid.
Hazardous polymerisation will not occur.
Product is considered stable under normal handling conditions.

Section 11 - TOXICOLOGICAL INFORMATION

POTENTIAL HEALTH EFFECTS

ACUTE HEALTH EFFECTS

SWALLOWED
Toxic effects may result from the accidental ingestion of the material; animal experiments indicate that ingestion of less than 40 gram may be fatal or may produce serious damage to the health of the individual.
The material can produce chemical burns within the oral cavity and gastrointestinal tract following ingestion.

EYE
The material can produce chemical burns to the eye following direct contact. Vapours or mists may be extremely irritating.
When applied to the eye(s) of animals, the material produces severe ocular lesions which are present twenty-four hours or more after instillation.
Eye contact in serious cases may cause blindness.
The vapour is highly discomforting.
capable of causing pain and severe conjunctivitis. Corneal injury may develop, with possible permanent impairment of vision, if not promptly and adequately treated.
The material may produce severe irritation to the eye causing pronounced inflammation.
Repeated or prolonged exposure to irritants may produce conjunctivitis.

continued...

SKIN
Skin contact with the material may damage the health of the individual; systemic effects may result following absorption.
The material can produce chemical burns following direct contact with the skin.
Bare unprotected skin should not be exposed to this material.
if exposure is prolonged.
Toxic effects may result from skin absorption.
The material may produce severe skin irritation after prolonged or repeated exposure, and may produce a contact dermatitis (nonallergic). This form of dermatitis is often characterised by skin redness (erythema) thickening of the epidermis.

Histologically there may be intercellular oedema of the spongy layer (spongiosis) and intracellular oedema of the epidermis. Prolonged contact is unlikely, given the severity of response, but repeated exposures may produce severe ulceration.

INHALED
Evidence shows, or practical experience predicts, that the material produces irritation of the respiratory system in a substantial number of individuals following inhalation.
Reactions may not occur on exposure but response may be delayed with symptoms only appearing many hours later.

CHRONIC HEALTH EFFECTS
Practical experience shows that skin contact with the material is capable either of inducing a sensitisation reaction in a substantial number of individuals, and/or of producing a positive response in experimental animals.
On the basis, primarily, of animal experiments, the material may be regarded as carcinogenic to humans. There is sufficient evidence to provide a strong presumption that human exposure to the material may result in cancer on the basis of:
- appropriate long-term animal studies
- other relevant information.
The material is considered to be harmful by all exposure routes.
Irritation may not occur immediately but may be delayed 24-48 hours.
Principal routes of exposure are usually by skin contact with the material skin contact/absorption of the material and inhalation of vapour.
Inhalation or skin contact may produce nonspecific discomfort, such as nausea, vomiting, diarrhoea, giddiness, fever, headache, weakness.
Cases of bronchial carcinoma and pulmonary carcinoma have been reported in men occupationally exposed to dimethyl sulfate.
Long term vapour exposures may lead to abnormal liver function with jaundice, abnormal kidney function with blood or albumin in urine. [DuPont]
When administered by inhalation, dimethyl sulfate induced squamous cell carcinomas of the nasal cavity in rats. When administered by subcutaneous injection, dimethyl sulfate induced local sarcomas in rats. Intravenous injection in pregnant rats induced nervous system tumors in off-spring.
Hydrolysis of the product may produce methanol.

TOXICITY AND IRRITATION

TOXICITY	IRRITATION
Inhalation (human) LCLo: 97 ppm/10m	Skin (rabbit)10mg/24h(open)- SEVERE
Oral (rat) LD50: 205 mg/kg	Skin (rabbit): 50 mg/24h - SEVERE
Inhalation (rat) LC50: 45 mg/m^3/4h	Eye (rabbit): 0.05 mg/24h - SEVERE
Inhalation (rat) LCLo: 32 ppm/4h	Eye (rabbit):0.75 mg - SEVERE
Inhalation (rat) LCLo: 17 ppm/18w I	Eye (rabbit): 100 mg/4s (rinse) - SEVERE

continued...

Section 11 - TOXICOLOGICAL INFORMATION

WARNING: This substance has been classified by the IARC as Group 2A: Probably Carcinogenic to Humans.
Tenth Annual Report on Carcinogens: Substance anticipated to be Carcinogen [National Toxicology Program: U.S. Dep. of Health & Human Services 2002].

METHANOL:

TOXICITY	IRRITATION
Oral (human) LDLo: 143 mg/kg	Skin (rabbit): 20 mg/24 h- Moderate
Oral (man) LDLo: 6422 mg/kg	Eye (rabbit): 40 mg- Moderate
Oral (man) TDLo: 3429 mg/kg	Eye (rabbit): 100 mg/24h- Moderate
Oral (rat) LD50: 5628 mg/kg	
Inhalation (human) TCLo: 86000 mg/m³	
Inhalation (human) TCLo: 300 ppm	
Inhalation (rat) LC50: 64000 ppm/4h	
Dermal (rabbit) LD50: 15800 mg/kg	

The material may cause skin irritation after prolonged or repeated exposure and may produce a contact dermatitis (nonallergic). This form of dermatitis is often characterised by skin redness (erythema) and swelling the epidermis. Histologically there may be intercellular oedema of the spongy layer (spongiosis) and intracellular oedema of the epidermis.

SULFURIC ACID:

TOXICITY	IRRITATION
Oral (rat) LD50: 2140 mg/kg	Eye (rabbit): 1.38 mg SEVERE
Inhalation (rat) LC50: 510 mg/m³/2h	Eye (rabbit): 5 mg/30sec SEVERE
Inhalation (human) TCLo: 3 mg/m³/24w	

WARNING: For inhalation exposure ONLY: This substance has been classified by the IARC as Group 1: CARCINOGENIC TO HUMANS.
Occupational exposures to strong inorganic acid mists of sulfuric acid:

Section 12 - ECOLOGICAL INFORMATION

Hazardous Air Pollutant:	Yes
Fish LC50 (96hr.) (mg/l):	7.5- 15
log Kow (Prager 1995):	0.032
Half- life Soil - High (hours):	12
Half- life Soil - Low (hours):	1.2
Half- life Air - High (hours):	365
Half- life Air - Low (hours):	36.5
Half- life Surface water - High (hours):	12
Half- life Surface water - Low (hours):	1.2
Half- life Ground water - High (hours):	12
Half- life Ground water - Low (hours):	1.2
Aqueous biodegradation - Aerobic - High (hours):	672
Aqueous biodegradation - Aerobic - Low (hours):	168
Aqueous biodegradation - Anaerobic - High (hours):	2688
Aqueous biodegradation - Anaerobic - Low (hours):	672
Photooxidation half- life air - High (hours):	365
Photooxidation half- life air - Low (hours):	36.5
Acid rate constant [M(H+)- HR]- 1:	1.2

Refer to data for ingredients, which follows:

METHANOL:

continued...

DO NOT discharge into sewer or waterways.
log Kow: -0.82- -0.66
Half-life (hr) air: 427
Half-life (hr) H2O surface water: 5.3-64
Henry's atm m^3 /mol: 1.35E-04
BOD 5 if unstated: 0.76-1.12
COD: 1.05-1.50,99%
ThOD: 1.5
BCF: 0.2-10
Toxicity Fish: LC50(96): 11-15mg/L
TLm(48Hr): 8000mg/L (trout))
Toxicity Arthropoda: NOEL 10 g/L/48Hr (Daphnia)) [ICI]

SULFURIC ACID:
Prevent, by any means available, spillage from entering drains or water courses.
DO NOT discharge into sewer or waterways.
Sulfuric acid is soluble in water and remains indefinitely in the environment as sulfate.
Large discharges may contribute to the acidification of water and be fatal to aquatic life and soil micro-organisms.
Large discharges may contribute to the acidification of effluent treatment systems and injure sewage treatment organisms. [ICI UK]

Section 13 - DISPOSAL CONSIDERATIONS

If possible, should let neutralized mixture stand for 24 hours before washing away with water.
Collected solution can be burned in a combustible solvent using an incinerator with an after burner and an alkali scrubber.
Any material in contact with DMS (e.g., rags, paper, wood, etc.) must be burned to prevent skin contact.

WASTE DISPOSAL PROCEDURES
• Collect and package recoverable quantities of dimethyl sulfate in labelled containers for recycling or incineration. Wear protective clothing, nitrile rubber gloves and eye protection to control personal contact. Work in a well ventilated area. Place 7.9g of 85% potassium hydroxide pellets in a 100mL flask.
Add 31.5mL of 95% ethanol. Heat the solution under gentle reflux and dropwise add 12.6g of the dimethyl sulfate and maintain gently reflux. Heat for an additional two hours. Cool and dilute the reaction mixture with water, wash the contents of the solution into the drain [Armour 1996].

SPILLAGE DISPOSAL
• Clear area of personnel. Wear nitrile rubber gloves, protective clothing, eye protection and breathing apparatus if required to control personal contact from dimethyl sulphate. Cover and contain the spill with a 1:1:1 mixture by weight of
soda ash, bentonite and sand. Scoop the absorbed contents into a container and transfer to a well ventilated area. Add the mixture to a stirred 10% solution of
sodium hydroxide. Allow to stand for 24 hours with stirring. Empty the liquid

continued...

into the drain. Discard the solid with normal refuse [Armour 1996].

Section 14 - TRANSPORTATION INFORMATION

Labels Required: TOXIC,CORROSIVE
HAZCHEM: 2XE

UNDG:

Dangerous Goods Class:	6.1	Subrisk:	8
UN Number:	1595	Packing Group:	I

Shipping Name:DIMETHYL SULPHATE

Maritime Transport IMDG:

IMDG Class:	6.1	IMDG Subrisk:	8
UN Number:	1595	Packing Group:	I
EMS Number:	F- A, S- B		

Shipping name:DIMETHYL SULPHATE

NOT REGULATED FOR TRANSPORT OF DANGEROUS GOODS:IATA

Section 15 - REGULATORY INFORMATION

REGULATIONS

dimethyl sulfate (CAS: 77-78-1) is found on the following regulatory lists;
International Agency for Research on Cancer (IARC) Carcinogens
OECD Representative List of High Production Volume (HPV) Chemicals
United Nations Convention Against Illicit Traffic in Narcotic Drugs and Psychotropic Substances - Table II

No data available for dimethyl sulfate as CAS: 139443-72-4, CAS: 62086-97-9, CAS: 98478-67-2.

Section 16 - OTHER INFORMATION

INGREDIENTS WITH MULTIPLE CAS NUMBERS

Ingredient Name	CAS
dimethyl sulfate	77- 78- 1, 139443- 72- 4, 62086- 97- 9, 98478-

continued...

methanol	67- 2 58456- 46- 5, 67- 56- 1, 19710 - 56- 6, 7263- 60- 7, 6853- 31- 2, 79825- 55- 1, 253142- 14- 2, 54841- 71- 3

REPRODUCTIVE HEALTH GUIDELINES

Ingredient	ORG	UF	Endpoint	CR	Adeq TLV
methanol	262 mg/m3	NA	NA	NA	Yes

These exposure guidelines have been derived from a screening level of risk assessment and should not be construed as unequivocally safe limits. ORGS represent an 8-hour time -weighted average unless specified otherwise.
CR = Cancer Risk/10000; UF = Uncertainty factor:
TLV believed to be adequate to protect reproductive health:
LOD: Limit of detection
Toxic endpoints have also been identified as:
D = Developmental; R = Reproductive; TC = Transplacental carcinogen
Jankovic J., Drake F.: A Screening Method for Occupational Reproductive American Industrial Hygiene Association Journal 57: 641-649 (1996).

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