DIMETHYL SULFATE

1. Product Identification

Synonyms: Sulfuric acid dimethyl ester; DMS; dimethyl monosulfate
CAS No.: 77-78-1
Molecular Weight: 126.13
Chemical Formula: C2H6O4S
Product Codes: K167

2. Composition/Information on Ingredients

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>CAS No</th>
<th>Percent</th>
<th>Hazardous</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimethyl Sulfate</td>
<td>77-78-1</td>
<td>98 - 100%</td>
<td>Yes</td>
</tr>
</tbody>
</table>

3. Hazards Identification

Emergency Overview

DANGER! VAPOR IS EXTREMELY DANGEROUS - THERE IS NO ODOR OR IMMEDIATE IRRITATION TO WARN OF INHALATION EXPOSURE. Headache and giddiness are early signs of exposure. Delayed effects include severe inflammation, chest tightness, trouble breathing and severe pulmonary damage. MAY BE FATAL IF SWALLOWED, INHALED OR ABSORBED THROUGH SKIN. CORROSIVE, COMBUSTIBLE LIQUID AND VAPOR. CAUSES SEVERE BURNS TO EVERY AREA OF CONTACT. AFFECTS THE EYES, SKIN, RESPIRATORY SYSTEM, LIVER, KIDNEYS AND CENTRAL NERVOUS SYSTEM. SUSPECT CANCER HAZARD. MAY CAUSE CANCER. Risk of cancer depends on level and duration of exposure.

SAF-T-DATA™ Ratings (Provided here for your convenience)

Health Rating: 4 - Extreme (Poison)
Flammability Rating: 2 - Moderate
Reactivity Rating: 1 - Slight
Potential Health Effects

HIGHLY TOXIC! CORROSIVE! CARCINOGEN! Delayed appearance of symptoms may permit unnoticed exposure to lethal quantities. Once absorbed into the body, lung damage and liver and kidney injury will occur.

**Inhalation:**
Extremely toxic vapors and liquid; a few whiffs could be fatal.

Material is extremely destructive to tissue of the mucous membranes and upper respiratory tract, eyes, and skin. Inhalation may be fatal as a result of spasms, inflammation and edema of the larynx and bronchi, chemical pneumonitis and pulmonary edema. Symptoms may include cough, swelling of tongue, lips, larynx, and lungs (later), shortness of breath, headache, nausea, and vomiting. Lethal concentrations as low as 97 ppm/10 minutes have been reported in humans.

**Ingestion:**
Extremely toxic if swallowed. Corrosive to tissues. Symptoms of exposure parallel those of inhalation.

**Skin Contact:**
Extremely toxic. Is absorbed through the skin; contact can be fatal. Causes blistering of the skin with symptoms paralleling those of inhalation.

**Eye Contact:**
Extremely toxic and corrosive. Eye contact will cause severe eye damage with toxic effects from absorption.

**Chronic Exposure:**
Suspected carcinogen. Positive animal studies showed local tumors after inhalation or subcutaneous injection, and tumors of the nervous system after prenatal exposure. May cause damage to kidneys, liver and lungs.

**Aggravation of Pre-existing Conditions:**
No information found.

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### 4. First Aid Measures

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

**Ingestion:**
If swallowed, **DO NOT INDUCE VOMITING.** Give large quantities of water. Never give anything by mouth to an unconscious person. Get medical attention immediately.

**Skin Contact:**
Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention immediately. Wash clothing before reuse. Thoroughly clean shoes before reuse.

**Eye Contact:**
Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

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### 5. Fire Fighting Measures

**Fire:**
Flash point: 83C (181F) CC
Autoignition temperature: 188C (370F)
Combustible Liquid and Vapor! Moderate fire potential when exposed to heat or flame.

**Explosion:**
Above the flash point, explosive vapor-air mixtures may be formed.

**Fire Extinguishing Media:**
- Water spray, dry chemical, alcohol foam, or carbon dioxide. Water spray may be used to keep fire exposed containers cool.

**Special Information:**
In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode. Dike fire control water for later disposal; do not scatter material.

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**6. Accidental Release Measures**

Ventilate area of leak or spill. Remove all sources of ignition. Wear appropriate personal protective equipment as specified in Section 8. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible. Use non-sparking tools and equipment. Collect liquid in an appropriate container or absorb with an inert material (e.g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer! US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

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**7. Handling and Storage**

Protect against physical damage. Outside or detached storage is preferred. Inside storage should be in a standard flammable liquids storage room or cabinet. Separate from oxidizing materials. Storage and use areas should be No Smoking areas. Wear special protective equipment (Sec. 8) for maintenance break-in or where exposures may exceed established exposure levels. Wash hands, face, forearms and neck when exiting restricted areas. Shower, dispose of outer clothing, change to clean garments at the end of the day. Avoid cross-contamination of street clothes. Wash hands before eating and do not eat, drink, or smoke in workplace. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product.

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**8. Exposure Controls/Personal Protection**

**Airborne Exposure Limits:**
- OSHA Permissible Exposure Limit (PEL):
  1 ppm (TWA) skin
- ACGIH Threshold Limit Value (TLV):
  0.1 ppm (TWA) skin, A3 animal carcinogen.
- NIOSH Recommended Exposure Limits (RELs):
  0.1 ppm (TWA) skin.
- NIOSH Immediately Dangerous to Life or Health (IDLH):
  7 ppm.

**Ventilation System:**
A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.

**Personal Respirators (NIOSH Approved):**
If the exposure limit is exceeded and engineering controls are not feasible, wear a supplied air, full-facepiece respirator, airlined hood, or full-facepiece self-contained breathing apparatus. Breathing air quality must meet the requirements of the OSHA respiratory protection standard (29CFR 1910.134).

**Skin Protection:**
Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact.

**Eye Protection:**
Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eye wash fountain and quick-drench facilities in work area.

### 9. Physical and Chemical Properties

**Appearance:**
Clear oily liquid.

**Odor:**
Faint onion-like odor.

**Solubility:**
2.8 g/100 ml @ 18C (64F)

**Specific Gravity:**
1.3283 @ 20C (77F)

**pH:**
No information found.

**% Volatiles by volume @ 21C (70F):**
100

**Boiling Point:**
188C (370F) Decomposes.

**Melting Point:**
-27C (-17F)

**Vapor Density (Air=1):**
4.35

**Vapor Pressure (mm Hg):**
0.5 @ 20C (68F)

**Evaporation Rate (BuAc=1):**
No information found.

### 10. Stability and Reactivity

**Stability:**
Stable under ordinary conditions of use and storage.

**Hazardous Decomposition Products:**
Burning may produce carbon monoxide, carbon dioxide, sulfur oxides.

**Hazardous Polymerization:**
Doesn't undergo hazardous polymerization.

**Incompatibilities:**
Strong oxidizing agents, strong bases, concentrated ammonia, ammonia solutions, sodium azide, ammonium hydroxide and metal salts.

**Conditions to Avoid:**
Heat, flames, ignition sources and incompatibles.

### 11. Toxicological Information

**Toxicological Data:**
Oral rat LD50: 205 mg/kg; Inhalation rat LC50: 45 mg/m3/4hrs; Irritation (open Draize) rabbit: skin = 10 mg/24 hrs., severe; Irritation (std Draize) rabbit: eye = 50 ug/24 hrs, severe. Investigated as a tumorigen, mutagen, reproductive effector.

**Carcinogenicity:**
12. Ecological Information

Environmental Fate:
This material is not expected to significantly bioaccumulate. When released into the air, this material is expected to be readily degraded by reaction with photochemically produced hydroxyl radicals.

Environmental Toxicity:
The LC50/96-hour values for fish are between 10 and 100 mg/l.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Domestic (Land, D.O.T.)
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Proper Shipping Name: DIMETHYL SULFATE
Hazard Class: 6.1, 8
UN/NA: UN1595
Packing Group: I
Information reported for product/size: 500G

International (Water, I.M.O.)
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Proper Shipping Name: DIMETHYL SULPHATE
Hazard Class: 6.1, 8
UN/NA: UN1595
Packing Group: I
Information reported for product/size: 500G

15. Regulatory Information

------------------\Chemical Inventory Status - Part 1\-------------------
Ingredient                      TSCA  EC  Japan  Australia
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Dimethyl Sulfate (77-78-1)       Yes   Yes  Yes    Yes

------------------\Chemical Inventory Status - Part 2\-------------------
Ingredient                      Korea  DSL  NDSL  Phil.
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Dimethyl Sulfate (77-78-1)       Yes   Yes  No     Yes

-----------------\Federal, State & International Regulations - Part 1\------------------
Ingredient                    -SARA 302-  ----SARA 313----
---------------------------------  RQ  TPQ  List  Chemical Catg.
WARNING:
THIS PRODUCT CONTAINS A CHEMICAL(S) KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER.

Australian Hazchem Code: 2XE
Poison Schedule: S7
WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

16. Other Information

NFPA Ratings: Health: 4 Flammability: 2 Reactivity: 0
Label Hazard Warning:
DANGER! VAPOR IS EXTREMELY DANGEROUS - THERE IS NO ODOR OR IMMEDIATE IRRITATION TO WARN OF INHALATION EXPOSURE. Headache and giddiness are early signs of exposure. Delayed effects include severe inflammation, chest tightness, trouble breathing and severe pulmonary damage. MAY BE FATAL IF SWALLOWED, INHALED OR ABSORBED THROUGH SKIN. CORROSIVE. COMBUSTIBLE LIQUID AND VAPOR. CAUSES SEVERE BURNS TO EVERY AREA OF CONTACT. AFFECTS THE EYES, SKIN, RESPIRATORY SYSTEM, LIVER, KIDNEYS AND CENTRAL NERVOUS SYSTEM. SUSPECT CANCER HAZARD. MAY CAUSE CANCER. Risk of cancer depends on level and duration of exposure.
Label Precautions:
Use only in a chemical fume hood.
Keep away from heat and flame.
Do not get in eyes, on skin, or on clothing.
Do not breathe vapor.
Keep container closed.
Wash thoroughly after handling.
Label First Aid:
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. In all cases get medical attention immediately.
Product Use:
Laboratory Reagent.
Revision Information:
No Changes.
Disclaimer:
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