

# DIETHYL SULFATE

DSU

## CAUTIONARY RESPONSE INFORMATION

|  |  |
|--|--|
| <b>Common Synonyms</b><br>Diethyl sulphate<br>Ethyl sulfate<br>Sulfuric acid, diethyl ester  | Liquid<br><br>Colorless<br><br>Ethereal,<br>peppermint odor<br><br>Sinks and very slowly dissolves in water. Gradually decomposes to produce sulfuric acid.  |
| <p><b>KEEP PEOPLE AWAY. AVOID CONTACT WITH LIQUID AND VAPOR.</b><br/>                 Avoid inhalation.<br/>                 Wear positive pressure breathing apparatus and special protective clothing.<br/>                 Call fire department.<br/>                 Notify local health and pollution control agencies.<br/>                 Protect water intakes.</p> |  |
| <b>Fire</b>  | <p>Combustible<br/>                 POISONOUS GASES ARE PRODUCED IN FIRE OR WHEN HEATED.<br/>                 Vapor may explode if ignited in an enclosed area.<br/>                 May cause fire on contact with a combustible material.<br/>                 Wear positive pressure breathing apparatus and special protective clothing.<br/>                 Combat fire from safe distance or protected area.<br/>                 Extinguish small fire: dry chemicals, CO<sub>2</sub>, water spray or foam;<br/>                 large fire: water spray, fog or foam.<br/>                 Cool exposed containers with water.</p>  |
| <b>Exposure</b>  | <p>CALL FOR MEDICAL AID.</p> <p>VAPOR<br/>                 POISONOUS IF INHALED.<br/>                 Irritating to eyes, skin and mucous membranes.<br/>                 Move to fresh air.<br/>                 If breathing has stopped, give artificial respiration.<br/>                 If breathing is difficult, give oxygen.</p> <p>LIQUID<br/>                 POISONOUS IF SWALLOWED.<br/>                 Will burn skin and eyes.<br/>                 Remove contaminated clothing and shoes.<br/>                 Flush contaminated areas with plenty of running water.<br/>                 IF IN EYES: hold eyelids open and flush with running water for at least 15 minutes.<br/>                 IF ON SKIN: Wash with soap and plenty of running water; speed in removing material from skin is of extreme importance. Remove and isolate contaminated clothing and shoes at the site.<br/>                 IF SWALLOWED: and victim is CONSCIOUS, give two glasses of water and induce vomiting.<br/>                 IF SWALLOWED: and victim is UNCONSCIOUS, do nothing but keep victim warm.</p> |
| <b>Water Pollution</b>   | <p>HARMFUL TO AQUATIC LIFE IN VERY LOW CONCENTRATIONS.<br/>                 May be dangerous if it enters water intakes.<br/>                 Notify local health and wildlife officials.<br/>                 Notify operators of nearby water intakes.</p>   |

### 1. CORRECTIVE RESPONSE ACTIONS

Stop discharge  
 Dilute and disperse  
 Collection Systems: Pump; Dredge  
 Do not burn  
 Clean shore line

### 2. CHEMICAL DESIGNATIONS

2.1 **CG Compatibility Group:** 34; Esters  
 2.2 **Formula:** (C<sub>2</sub>H<sub>5</sub>)<sub>2</sub>SO<sub>4</sub>  
 2.3 **IMO/UN Designation:** 6.1/1594  
 2.4 **DOT ID No.:** 1594  
 2.5 **CAS Registry No.:** 64-67-5  
 2.6 **NAERG Guide No.:** 152  
 2.7 **Standard Industrial Trade Classification:** 51549

### 3. HEALTH HAZARDS

- 3.1 **Personal Protective Equipment:** Wear positive pressure breathing apparatus and special protective clothing.
- 3.2 **Symptoms Following Exposure:** May be fatal if inhaled, swallowed or absorbed through skin. Inhalation causes nausea and vomiting. Causes burns to skin and eyes. Ingestion may cause nausea, vomiting abdominal pain and collapse.
- 3.3 **Treatment of Exposure:** INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. EYES OR SKIN: Irrigate with running water for at least 15 min.; hold eyelids open if necessary. Consult an ophthalmologist immediately. Wash skin with soap and water. Speed in removing material from skin is of extreme importance. Remove contaminated clothing and shoes at the site. Keep victim quiet and maintain normal body temperature. Effects may be delayed; keep victim under observation. INGESTION: If victim is conscious, give victim two glasses of water and have victim induce vomiting.
- 3.4 **TLV-TWA:** Not listed.  
 3.5 **TLV-STEL:** Not listed.  
 3.6 **TLV-Ceiling:** Not listed.  
 3.7 **Toxicity by Ingestion:** Grade 2; LD<sub>50</sub> = 647 mg/kg (mouse)  
 3.8 **Toxicity by Inhalation:** Currently not available.  
 3.9 **Chronic Toxicity:** Causes mutagenic, tumorigenic and carcinogenic effects.
- 3.10 **Vapor (Gas) Irritant Characteristics:** Vapor cause severe irritation of eyes and throat (mucous membranes) and can cause eye and lung injury.
- 3.11 **Liquid or Solid Characteristics:** Fairly severe skin irritant. May cause pain and second-degree burns after a few minutes contact.
- 3.12 **Odor Threshold:** Currently not available  
 3.13 **IDLH Value:** Not listed.  
 3.14 **OSHA PEL-TWA:** Not listed.  
 3.15 **OSHA PEL-STEL:** Not listed.  
 3.16 **OSHA PEL-Ceiling:** Not listed.  
 3.17 **EPA AEGL:** Not listed

### 4. FIRE HAZARDS

- 4.1 **Flash Point:** 235°F O.C.  
 220°F C.C
- 4.2 **Flammable Limits in Air:** 4.1% (LFL)
- 4.3 **Fire Extinguishing Agents:** Small fires: dry chemical, CO<sub>2</sub>, water spray or foam; large fires: water spray, fog or foam. Alcohol foam, universal foam. Water or foam may cause frothing.
- 4.4 **Fire Extinguishing Agents Not to Be Used:** Not pertinent
- 4.5 **Special Hazards of Combustion Products:** Highly toxic fumes containing sulfur oxides may be generated along with thermal decomposition products such as ethyl ether and ethylene. Sulfuric acid may be produced in the presence of moisture.
- 4.6 **Behavior in Fire:** It burns to yield highly, toxic sulfur oxides. Above 100°C, it undergoes thermal decomposition to yield ethyl ether, ethylene and sulfur oxides which may cause an explosion in closed containers or confined spaces.
- 4.7 **Auto Ignition Temperature:** 817°F
- 4.8 **Electrical Hazards:** Currently not available
- 4.9 **Burning Rate:** Currently not available
- 4.10 **Adiabatic Flame Temperature:** Currently not available
- 4.11 **Stoichiometric Air to Fuel Ratio:** 26.2 (calc.)
- 4.12 **Flame Temperature:** Currently not available
- 4.13 **Combustion Molar Ratio (Reactant to Product):** 10.0 (calc.)
- 4.14 **Minimum Oxygen Concentration for Combustion (MOCC):** Not listed

### 5. CHEMICAL REACTIVITY

- 5.1 **Reactivity with Water:** Reacts slowly with cold water about 0.05 percent per hour at 25°C, to yield monoethyl sulfate and ethyl alcohol. Reacts vigorously with water at temperature above 50°C. Sulfuric acid may be produced along with ethyl alcohol and monoethyl sulfate.
- 5.2 **Reactivity with Common Materials:** Avoid contact with aqueous alkali, concentrated nitric acid and strong oxidizing agents such as peroxides and peracids. Violent reaction occurs with potassium and tert-butoxide. It may react with moisture to yield sulfuric acid which subsequently may react with a metal container to liberate hydrogen gas resulting in an explosion.
- 5.3 **Stability During Transport:** Stable
- 5.4 **Neutralizing Agents for Acids and Caustics:** Dilute aqueous sodium hydroxide.
- 5.5 **Polymerization:** Not pertinent
- 5.6 **Inhibitor of Polymerization:** Not pertinent

### 6. WATER POLLUTION

- 6.1 **Aquatic Toxicity:**  
 TLM 96:100-10 ppm
- 6.2 **Waterfowl Toxicity:** Currently not available
- 6.3 **Biological Oxygen Demand (BOD):**  
 Currently not available
- 6.4 **Food Chain Concentration Potential:**  
 Currently not available
- 6.5 **GESAMP Hazard Profile:**  
 Bioaccumulation: 0  
 Damage to living resources: 2  
 Human Oral hazard: 1  
 Human Contact hazard: II  
 Reduction of amenities: XXX

### 7. SHIPPING INFORMATION

- 7.1 **Grades of Purity:** 100%
- 7.2 **Storage Temperature:** Ambient
- 7.3 **Inert Atmosphere:** Not listed
- 7.4 **Venting:** Not pertinent
- 7.5 **IMO Pollution Category:** (B)
- 7.6 **Ship Type:** 2
- 7.7 **Barge Hull Type:** Currently not available

### 8. HAZARD CLASSIFICATIONS

- 8.1 **49 CFR Category:** Poison
- 8.2 **49 CFR Class:** 6.1
- 8.3 **49 CFR Package Group:** II
- 8.4 **Marine Pollutant:** No
- 8.5 **NFPA Hazard Classification:**
- | Category                  | Classification |
|---------------------------|----------------|
| Health Hazard (Blue)..... | 3              |
| Flammability (Red).....   | 1              |
| Instability (Yellow)..... | 1              |
- 8.6 **EPA Reportable Quantity:** 10 pounds
- 8.7 **EPA Pollution Category:** A
- 8.8 **RCRA Waste Number:** Not listed
- 8.9 **EPA FWPCA List:** Not listed

### 9. PHYSICAL & CHEMICAL PROPERTIES

- 9.1 **Physical State at 15° C and 1 atm:** Liquid
- 9.2 **Molecular Weight:** 154.18
- 9.3 **Boiling Point at 1 atm:** 409°F = 209.5°C = 483°K
- 9.4 **Freezing Point:** -12°F = -24.4°C = 249°K
- 9.5 **Critical Temperature:** Currently not available
- 9.6 **Critical Pressure:** Currently not available
- 9.7 **Specific Gravity:** 1.1803 at 20°C
- 9.8 **Liquid Surface Tension:** 33.5 dynes/cm = .034 N/m at 20°C
- 9.9 **Liquid Water Interfacial Tension:** Currently not available
- 9.10 **Vapor (Gas) Specific Gravity:** 5.3
- 9.11 **Ratio of Specific Heats of Vapor (Gas):**  
 Currently not available
- 9.12 **Latent Heat of Vaporization:** Currently not available
- 9.13 **Heat of Combustion:** Currently not available
- 9.14 **Heat of Decomposition:** Not pertinent
- 9.15 **Heat of Solution:** Currently not available
- 9.16 **Heat of Polymerization:** Not pertinent
- 9.17 **Heat of Fusion:** Currently not available
- 9.18 **Limiting Value:** Currently not available
- 9.19 **Reid Vapor Pressure:** Currently not available

### NOTES

# DIETHYL SULFATE

DSU

| 9.20<br>SATURATED LIQUID DENSITY |                       | 9.21<br>LIQUID HEAT CAPACITY |   | 9.22<br>LIQUID THERMAL CONDUCTIVITY |   | 9.23<br>LIQUID VISCOSITY   |            |
|----------------------------------|-----------------------|------------------------------|---|-------------------------------------|---|----------------------------|------------|
| Temperature<br>(degrees F)       | Pounds per cubic foot | Temperature<br>(degrees F)   | British thermal unit per<br>pound-F   | Temperature<br>(degrees F)          | British thermal unit inch<br>per hour-square foot-F   | Temperature<br>(degrees F) | Centipoise |
| 68                               | 73.810                |                              | C<br>U<br>R<br>R<br>E<br>N<br>T<br>L<br>Y<br><br>N<br>O<br>T<br><br>A<br>V<br>A<br>I<br>L<br>A<br>B<br>L<br>E |                                     | C<br>U<br>R<br>R<br>E<br>N<br>T<br>L<br>Y<br><br>N<br>O<br>T<br><br>A<br>V<br>A<br>I<br>L<br>A<br>B<br>L<br>E | 68                         | 1.790      |

| 9.24<br>SOLUBILITY IN WATER |                                   | 9.25<br>SATURATED VAPOR PRESSURE                     |  | 9.26<br>SATURATED VAPOR DENSITY                                    |  | 9.27<br>IDEAL GAS HEAT CAPACITY |   |
|-----------------------------|-----------------------------------|--|--|--|--|---------------------------------|---|
| Temperature<br>(degrees F)  | Pounds per 100 pounds<br>of water | Temperature<br>(degrees F)                           | Pounds per square inch   | Temperature<br>(degrees F)   | Pounds per cubic foot  | Temperature<br>(degrees F)      | British thermal unit per<br>pound-F   |
| 68                          | 0.700                             | 175<br>200<br>225<br>250<br>275<br>300<br>325<br>350 | 0.138<br>0.282<br>0.531<br>0.935<br>1.560<br>2.490<br>3.827<br>5.700 | 125<br>150<br>175<br>200<br>225<br>250<br>275<br>300<br>325<br>350 | 0.00057<br>0.00143<br>0.00310<br>0.00608<br>0.01099<br>0.01868<br>0.03017<br>0.04674<br>0.06993<br>0.10153 |                                 | C<br>U<br>R<br>R<br>E<br>N<br>T<br>L<br>Y<br><br>N<br>O<br>T<br><br>A<br>V<br>A<br>I<br>L<br>A<br>B<br>L<br>E |