Material Safety Data Sheet

Section I - Chemical Product And Company Identification

Product Name: Ethylene Glycol
CAS Number: 107-21-1    HBCC MSDS No. CE03000

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Section II - Composition/Information On Ingredients

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>CAS Number</th>
<th>%</th>
<th>ACGIH TLV</th>
<th>OSHA PEL</th>
<th>STEL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethylene Glycol (particulate)</td>
<td>107-21-1</td>
<td>&gt; 99</td>
<td>10 mg/m³</td>
<td>50 ppm</td>
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</table>

Exposure Limits (TWAs) in Air

Section III - Hazard Identification

Routes of Exposure: Ethylene glycol may affect the body either through ingestion, inhalation, or contact with the eyes and/or skin.

Summary of Acute Health Hazards

Ingestion: Swallowing may result in severe effects, even death. May cause nausea or vomiting. May cause abdominal discomfort or diarrhea. Excessive exposure may cause central nervous system effects, cardiopulmonary effects (metabolic acidosis), and kidney failure. The lethal dose in adult humans for ethylene glycol is approximately 3 ounces (100 ml) (1/3 cup).

Inhalation: At room temperature, exposures to vapors are unlikely due to physical properties; higher temperatures may generate vapor levels sufficient to cause adverse effects.

Skin: Essentially nonirritating to skin, but repeated skin exposure to large quantities may result in skin irritation with local redness. Massive contact with damaged skin or of material sufficiently hot to burn skin may result in absorption of potential lethal amounts.

Eyes: May cause slight transient (temporary) eye irritation. Corneal injury is unlikely. Vapors or mists may irritate eyes. Symptoms include stinging, tearing, redness and swelling of eyes.

Carcinogenicity Lists: No NTP: No IARC Monograph: No OSHA Regulated: No Effects of Overexposure: Repeated excessive exposure may cause irritation of the upper respiratory tract. In humans, effects have been reported on the following organs: Central nervous system. Observations in humans include: Nystagmus (involuntary eye movement). In animals, effects have been reported on the following organs: Kidney, liver. Based on animal studies, ingestion of very large amounts of
ethylene glycol appears to be the major and possibly only route of exposure to produce birth defects. Exposures by inhalation or skin contact, the primary routes of occupational exposure, had minimal effect on the fetus, in animal studies. Ingestion of large amounts of ethylene glycol has been shown to interfere with reproduction in animals.

**Summary of Chronic Health Hazards:** Chronic symptoms and signs include: anorexia, oliguria, nystagmus, lymphocytosis, and loss of consciousness. Inhalation seems to primarily result in central nervous system depression and hematopoietic dysfunction, whereas, ingestion may result in depression followed by respiratory and cardiac failure, renal and brain damage. Can cause kidney damage.

**Note to Physicians:** If several ounces of Ethylene Glycol have been ingested, early administration of ethanol may counter the toxic effects (metabolic acidosis, renal damage). Consider hemodialysis or peritoneal dialysis & thiamine 100 mg plus pyridoxine 50 mg IV every 6 hr.

If ethanol is used, a therapeutically effective blood concentration in the range of 100 – 150 mg/dl may be achieved by a rapid loading dose followed by a continuous intravenous infusion. Consult standard literature for details of treatment.

4-Methyl pyrazole (Antizol.) is an effective blocker of alcohol dehydrogenase and should be used in the treatment of ethylene glycol, di- or triethylene glycol, ethylene glycol butyl ether, or methanol intoxication if available.

Fomepizole protocol (Brent, J. et al., New England Journal of Medicine, Feb. 8, 2001, 344:6, p. 424-9): loading dose 15 mg/kg IV, follow by bolus dose to 15 mg/kg every 12 hours.

Continue formepizole until serum methanol, EG, DEG, or TEG are undetectable. The signs and symptoms of poisoning include anion gap metabolic acidosis, CNS depression, renal tubular injury, and possible late stage cranial nerve involvement. Respiratory symptoms, including pulmonary edema, may be delayed. Persons receiving significant exposure should be observed 24-48 hours for signs of respiratory distress.

In severe poisoning, respiratory support with mechanical ventilation and positive end expiratory pressure may be required.

If lavage is performed, suggest endotracheal and/or esophageal control. Danger from lung aspiration must be weighed against toxicity when considering emptying the stomach.

### Section IV - First Aid Measures

**Ingestion:** Contact a Poison Control Center Immediately. Do not induce vomiting. Give two glasses of water to a fully conscious person. GET MEDICAL ATTENTION.

**Inhalation:** Remove victim to fresh air immediately. If effects occur, GET MEDICAL ATTENTION.

**Skin:** Remove contaminated clothing and shoes, and wash skin with plenty of soap and water. Launder clothing before reuse.

**Eyes:** Hold eyelids open and flush with plenty of water, for 15 minutes. If irritation persists, GET MEDICAL ATTENTION.

### Section V - Fire Fighting Measures

**Flash Point:** 232°F; 111°C  
**Autoignition Temperature:** 748°F; 398°C  
**Lower Explosive Limit:** 3.2%  
**Upper Explosive Limit:** 15.3%  

**Unusual Fire and Explosion Hazards:** Container may rupture from gas generation or eruption may occur upon application of direct water stream to hot liquids.

**Extinguishing Media:** Water fog or fine spray. Alcohol resistant foams (ATC type)
are preferred if available. General purpose synthetic foams (including AFFF) or protein foams may function, but much less effectively. Carbon dioxide. Dry Chemical powder. Do not use direct water stream. May spread fire.

**Hazardous Combustion Products:** During a fire, smoke may contain the original material in addition to combustion products of varying composition which may be toxic and/or irritating. Combustion products may include and are not limited to: Carbon monoxide. Carbon dioxide.

**Special Firefighting Procedures:** Keep people away. Isolate fire and deny unnecessary entry. Use water spray to cool fire exposed containers and fire affected zone until fire is out and danger of reignition has passed. Fight fire from protected location or safe distance. Consider the use of unmanned hose holders or monitor nozzles. Immediately withdraw all personnel from the area in case of rising sound from venting safety device or discoloration of the container. Burning liquids may be extinguished by dilution with water. Do not use direct water stream. May spread fire. Move container from fire area if this is possible without hazard. Burning liquids may be moved by flushing with water to protect personnel and minimize property damage. In the event of a fire and/or explosion, do not breathe fumes. Wear positive-pressure self-contained breathing apparatus (SCBA) and protective fire fighting clothing (includes fire fighting helmet, coat, pants, boots, and gloves). If protective equipment is not available or not used, fight fire from a protected location or safe distance.

### Section VI - Accidental Release Measures

Avoid entry into sewers or natural waters.

**Small Spills:** Absorb liquid on vermiculite, floor absorbent or other absorbent material. Persons not wearing proper personal protective equipment should be excluded from area of spill. Collect material with vacuum cleaner.

**Large Spills:** Persons not wearing protective equipment should be excluded from area of spill until clean-up has been completed. Stop spill at source, dike area of spill to prevent spreading, pump liquid to salvage tank. Remaining liquid may be taken up on sand, clay, earth, floor absorbent, or other absorbent material and shoveled into containers. Do not flush into sewers. Material should be placed in a non-combustible container for recovery or transfer to a disposal facility.

### Section VII - Handling and Storage

Avoid ingestion and skin and eye contact. Practice reasonable caution and personal cleanliness. Product on surfaces can cause slippery conditions. Containers of this material may be hazardous when emptied. Since emptied containers retain product residues (vapor, liquid, and/or solid), all hazard precautions given in the data sheet must be observed. Warning. Sudden release of hot organic chemical vapors or mists from process equipment operating at elevated temperature and pressure, or sudden ingress of air into vacuum equipment, may result in ignitions without the presence of obvious ignition sources. Keep containers tightly closed.

**Other Precautions:** Ethylene glycol's vapor pressure is such that at room temperature, toxic concentrations are unlikely to occur. Poisoning resulting from vapor usually occurs only if ethylene glycol is heated; therefore, occupational exposure is rare. Spills on hot fibrous insulations may lead to lowering of the autoignition temperatures possibly resulting in spontaneous combustion.
Section VIII - Exposure Controls/Personal Protection

**Respiratory Protection:** Atmospheric levels should be maintained below the exposure guideline. When respiratory protection is required for certain operations, use an MSHA/NIOSH-approved air-purifying respirator. Chemical respirator with organic vapor cartridge, full facepiece, dust and mist filter.

**Ventilation:** Good general ventilation should be sufficient for most conditions (typically 10 air changes per hour). Local exhaust ventilation may be necessary for some operations.

**Protective Clothing:** Use impervious gloves when prolonged or frequent contact could occur. Use safety glasses. If vapor exposure causes eye irritation, use a full-face respirator.

**Other Protective Clothing or Equipment:** An eye wash and safety shower should be in close proximity.

**Work/Hygienic Practices:** All employees who handle this product should wash their hands before eating, drinking, smoking, or using toilet facilities. Do NOT place food, coffee or other drinks in the area where dusting or splashing of solutions is possible.

Section IX - Physical and Chemical Properties

<table>
<thead>
<tr>
<th>Physical State: Liquid</th>
<th>pH: 9</th>
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<tbody>
<tr>
<td>Melting Point/Range: -13°C (8.6°F)</td>
<td>Boiling Point/Range: 197°C (387°F)</td>
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<tr>
<td>Appearance/Color/Odor: Colorless, odorless.</td>
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<tr>
<td>Solubility in Water: Miscible</td>
<td>Vapor Pressure (mmHg): 0.060 @ 68°F</td>
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<tr>
<td>Specific Gravity (Water=1): 1.115</td>
<td>Molecular Weight: 62 g/mol</td>
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<tr>
<td>Vapor Density (Air=1): 2.1</td>
<td>% Volatiles: N/A</td>
</tr>
<tr>
<td>How to detect this compound: N/A</td>
<td>Freezing Point: -13°C; (9.0°F)</td>
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<tr>
<td>Bulk Density: 1.240 lbs./ft.³</td>
<td>Liquid Density: 9.280 lbs/gal @ 68°F, 1.114 kg/l @ 20°C</td>
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</table>

Section X - Stability and Reactivity

**Stability:** Stable  
**Hazardous Polymerization:** Will Not Occur

**Conditions to Avoid:** Exposure to elevated temperatures can cause product to decompose. Generation of gas during decomposition can cause pressure in closed systems.

**Materials to Avoid:** Avoid unintended contact with acids, bases, and oxidizing materials. Oxidizing materials such as nitric acid can attack product. The severity can vary from slight degradation to an explosive reaction.

**Hazardous Decomposition Products:** Burning produces normal products of combustion, such as carbon monoxide, carbon dioxide, and water. Aldehydes. Alcohols. Ethers.

Section XI - Toxicological Information

**Peroral Human; Lethal Dose; approximately 3 ounces (100 ml) (1/3 cup)**

**Peroral Rat:** LD50 (6000 – 13000) mg/kg
Percutaneous
Rabbit; LD50 = > 22270 mg/kg
Inhalation
Rat; LC50 = > 3.95 mg/L; Aerosol, 7 hours
Ingestion of large amounts of ethylene glycol has been shown to interfere with reproduction in animals.

Section XII - Ecological Information

Material is readily biodegradable. Passes OECD test(s) for ready biodegradability. The rate constant for the vapor phase reaction with photochemically produced hydroxyl radicals at 25°C is estimated to be: 8.32E-12 cm²/molecule-sec. Biodegradation reached in Modified OECD Screening Test (OECD Test No. 301 E) after 28 days: >90%. Biodegradation reached in Manometric Respirometry Test (OECD Test No. 301F) after 28 days: >94%.

BOD (% Oxygen consumption): Day 5: 60.5%, Day 10: 82%, Day 20: 89.1%
Toxicity to Micro-Organisms:
activated sludge (OECD Test No. 209); 1050, Result value: > 1000 mg/L
bacterial/NA; 16 h; EC50, Result value: > 1000 mg/L
Toxicity to Aquatic Invertebrates:
water flea (Ceriodaphnia dubia); LC50, Result value: (10000-25800) mg/L
green alga (S. capricornutum); Growth inhibition; EC50, Result value: (9500-13000) mg/L
Toxicity to Fish:
fathead minnow (Pimehales promelas); LC50, Result value: 51000 mg/L
bluegill (Lepomis macrochirus); LC50, Result value: 27540 mg/L
rainbow trout (Oncorhynchus mykiss); LC50, Result value: (18000-46000) mg/L
guppy (Poecilia reticulate); LC50, Result value: 49300 mg/L
golden orfe (Leuciscus idus); LC50, Result value: > 10000 mg/L
Bioconcentration potential is low (BCF < 100 or Log Pow < 3). Henry’s Law Constant (H) is: 8.05E-9 atm-m³/mol. Bioconcentration factor (BCF) in fish is: 10. Potential for mobility in soil is very high (Koc between 0 and 50). Soil organic carbon/water partition coefficient (Koc) is estimated to be: 1. Theoretical Oxygen Demand (THOD) – calculated: 1.29 mg/mg.
Octanol/Water Partition Coefficient – Measured: -1.36

Section XIII - Disposal Considerations

Dispose of in accordance with applicable local, county, state and federal regulations.

Section XIV - Transport Information

DOT Proper Shipping Name: (Bulk) Other Regulated Substances, Liquid, NOS
DOT Hazard Class/ I.D. No.: (Bulk) 9, NA3082, III
Not regulated for non-bulk

Section XV - Regulatory Information

WARNING
This product contains chemicals known to the State of California to cause cancer. Acetaldehyde 75-07-0 <= 0.0008%
1,4-Dioxanec.123-91-1 <= 0.2500 ppm
Superfund Amendments and Reauthorization Act of 1986 Title III (Emergency Planning and Community Right to Know Act) Sections 311 and 312
Delayed (Chronic) Health Hazard: Yes
Fire (Hazard): No

Product Name: Ethylene Glycol
Immediate (Acute) Health Hazard: Yes
Reactive Hazard: No
Sudden Release of Pressure Hazard: No

**California SCAQMD Rule 443.1 (South Coast Air Quality Management District Rule 443.1, Labeling of Material Containing Organic Solvents)**

- VOC: Vapor pressure 0.06 mmHg at 20°C: 1111.0 g/l
- **Reportable Quantity**: 5,000 Lb. (2,270 Kg.)
- **Uniform Fire Code Rating**: Class IIIB Combustible Liquid
- **NFPA Rating**: Health - 2; Flammability - 1; Instability - 0
  - 0=Insignificant 1=Slight 2=Moderate 3=High 4=Extreme
- **Carcinogenicity Lists**:
  - NTP: No
  - IARC Monograph: No
  - OSHA Regulated: No

**Section 313 Supplier Notification**: This product contains the following toxic chemical(s) subject to the reporting requirements of SARA TITLE III Section 313 of the Emergency Planning and Community Right-To Know Act of 1986 and of 40 CFR 372:

<table>
<thead>
<tr>
<th>CAS #</th>
<th>Chemical Name</th>
<th>% By Weight</th>
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<tbody>
<tr>
<td>107-21-1</td>
<td>Ethylene Glycol</td>
<td>&gt; 99%</td>
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</table>

**Synonyms/Common Names**: Glycol, Monoethylene Glycol, 1,2-Ethanediol, EG

**Chemical Family/Type**: N/A

**Section(s) changed since last revision**: III, IV, V, VI, VII, VIII, IX, XV

**IMPORTANT!** Read this MSDS before use or disposal of this product. Pass along the information to employees and any other persons who could be exposed to the product to be sure that they are aware of the information before use or other exposure. This MSDS has been prepared according to the OSHA Hazard Communication Standard [29 CFR 1910.1200]. The MSDS information is based on sources believed to be reliable. However, since data, safety standards, and government regulations are subject to change and the conditions of handling and use, or misuse are beyond our control, **Hill Brothers Chemical Company** makes no warranty, either expressed or implied, with respect to the completeness or continuing accuracy of the information contained herein and disclaims all liability for reliance thereon. Also, additional information may be necessary or helpful for specific conditions and circumstances of use. It is the user's responsibility to determine the suitability of this product and to evaluate risks prior to use, and then to exercise appropriate precautions for protection of employees and others.