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MATERIAL SAFETY DATA SHEET

1. CHEMICAL PRODUCT & COMPANY INFORMATION

PRODUCT IDENTITY: Ethylene Glycol

Chemical Name: Ethylene Glycol

Chemical Family: Glycol

Synonyms: M.E.G. Monoethylene Glycol; 1, 2-Dihydroxyethane;

1, 2-Ethanediol; Ethylene Dihydrate

Chemical Formula: $C_2H_6O_2$

Formula Wt: 62.08

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2. COMPOSITION / INFORMATION ON INGREDIENTS

MATERIAL	CAS#	% BY WT
Ethylene Glycol	107-21-1	99.5%
Diethylene Glycol	111-46-6	0.5%

Exposure Guidelines: OSHA STANDARDS - An employee's exposure to ethylene glycol

shall at no time exceed the ceiling value of 50 ppm (125 mg/m³).

AGGIH THRESHOLD LIMIT VALUES - Ceiling Limit 50 ppm,
127 mg/m³ (1981) Vapor & mist

3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

Appearance
Physical State

Colorless
Liquid

Odor

Sweet

Hazards of product HARMFUL OR FATAL IF SWALLOWED.
MAY CAUSE EYE IRRITATION
MAY CAUSE RESPIRATORY TRACT IRRITATION.

HAZARD RATING SYSTEM

NPFA: HEALTH: 1

FLAMMABILITY: 1

REACTIVITY: 0

KEY: 0 - Minimal, 1 - Slight, 2 - Moderate, 3 - Serious, 4 – Severe

POTENTIAL HEALTH EFFECTS

Routes of Exposure:

Skin, eyes, inhalation, ingestion.

Signs and Symptoms of Exposure:

Incidental ingestion of small amounts of ethylene glycol is not likely to cause any significant health effects. Ingestion of large quantities may result in irritability, mental sluggishness, dizziness, malaise, abdominal or back pain. Changes in urine output and appearance, fluid retention, jaundice (yellowish skin color), kidney and liver damage, respiratory failure, and unconsciousness is evidence of severe poisoning. Death may occur in extreme cases.

Skin:

Contact with liquid may cause slight skin irritation.

Eyes:

Contact with liquid may cause slight eye irritation.

Inhalation:

Inhalation of mists or high concentrations of vapors (e.g., from hot operations) may cause upper respiratory tract irritation, headaches or nausea.

Ingestion:

Ingestion of large quantities may be harmful, and in extreme poisoning, may be fatal; causes central nervous system depression, cardiopulmonary effects, and kidney and liver damage. See “Signs and Symptoms” for more information.

DELAYED/LONG TERM EFFECTS

Carcinogenic Effects:

Ethylene glycol is not considered a carcinogen.

Mutagenic: Ethylene glycol is not considered a mutagen.

Teratogenic: Ethylene glycol is considered to be an animal teratogen based on studies in which high levels were given in drinking water. Inhalation and dermal exposure have not produced significant fetotoxicity or malformations in animals. See Section 11, "Toxicology", for further information.

Target Organ Effects: Central nervous system, kidney, liver, fetus.

Medical Conditions Exposure to this chemical may aggravate preexisting skin and Aggravated by Exposure: respiratory conditions.

4. FIRST AID MEASURES

Ensure Physician Has Access To This MSDS.

4.3 Skin: Wash with soap and water after handling material. If persistent irritation develops, get medical attention.

4.2 Eyes: If eye contact occurs, flush with water. If persistent irritation develops, get medical attention.

4.1 Inhalation: If inhaled, immediately remove victim to fresh air. If effects occur, consult a physician.

4.4 Ingestion: If quantities of this material are swallowed, immediately **call physician**. DO NOT induce vomiting. Never give anything by mouth or induce vomiting in an unconscious person. If person is fully conscious give 1 cup or 8 ounces (240 ml) of water. If medical advice is delayed and if an adult has swallowed as 80 proof whiskey. For children, give proportionally less liquor at a dose of 0.3 ounces (1 ½ tsp) (8 ml) liquor for each 10 pounds of body weight, or 2 ml per kg body weight [e.g., 1.2 ounce (2 1/3 Tbsp) for a 40 pound child or 36 ml for an 18 kg child].

4.5 Note to Physicians: The principal toxic effects of ethylene glycol, when swallowed, are kidney damage and metabolic acidosis. Ethanol is antidotal, and early administration may block the formation of toxic metabolites of ethylene glycol in the liver. Ethanol should be given intravenously, as a 5% solution in

sodium bicarbonate, at a rate of about 10ml/hr. A desired therapeutic level of ethanol in blood is 100mg/dl. Hemodialysis may be required. Pulmonary edema with hypoxemia has been described in a number of patients following poisoning with ethylene glycol. The mechanism has not been elucidated but it appears to be noncardiogenic in origin in ventilation and positive end expiratory pressure may be applied. Correction of acidosis is essential.

5. FIRE FIGHTING MEASURES ***FIRE & EXPLOSION HAZARD DATA***

5.1 FLAMMABLE PROPERTIES

Flashpoint (TOC):	116oC (241oF)
Auto Ignition Temp:	398oC (748oF)
LEL:	3.2% by volume
UEL:	15.3% by volume

5.2 EXTINGUISHING MEDIA

Water fog or fine spray. Dry chemical fire extinguishers. Carbon dioxide fire extinguishers. Foam. Do not use direct water stream. May spread fire. Alcohol resistant foams (ATC type) are preferred. General purpose synthetic foams (including AFFF) or protein foams may function, but will be less effective.

5.3 FIRE FIGHTING 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 resignation has passed. Fight fire from a 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. Hand held dry chemical or carbon dioxide extinguishers may be used for small fires. 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.

5.4 SPECIAL PROTECTIVE EQUIPMENT FOR FIREFIGHTERS

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.

5.5 UNUSUAL FIRE AND EXPLOSION HAZARDS

Container may rupture from gas generation in a fire situation. Violent steam generation or eruption may occur upon application of direct water stream to hot liquids.

5.6 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.

6. ACCIDENTAL RELEASE MEASURES

Small Spill:

Absorb with materials such as: cat litter, sand, sawdust. Vermiculite. Large spills: Dike area to contain spill. Pump into suitable and properly labeled containers.

Personal Precautions:

Isolate area. Keep unnecessary and unprotected personnel from entering the area. Use appropriate safety equipment. For additional information, refer to Section 8, Exposure Controls and Personal Protection.

Environmental Precautions:

Prevent from entering into soil, ditches, sewers, waterways and/or groundwater.

7. HANDLING AND STORAGE

Keep containers tightly closed. Store in a cool, dry, well-ventilated location, away from strong oxidizers, potential fire hazards, and incompatible chemicals.

8. PERSONAL PROTECTION

Respiratory Protection:

Respiratory protection is required if airborne concentration exceeds TLV. At any detectable concentration, any self-contained breathing apparatus with a full face piece and operated in a pressure-demand or other positive pressure mode or any supplied-air respirator with a full-face piece

and operated in a pressure-demand or other positive pressure mode in combination with an auxiliary self-contained breathing apparatus operated in pressure-demand or other positive pressure mode.

Skin Protection:

Protective gloves recommended when prolonged skin contact cannot be avoided. Polyethylene; Neoprene, Nitrile, Polyvinyl alcohol; Natural Rubber; Butyl Rubber. Safety shower should be available.

Eye Protection:

Safety goggles and face shield. Emergency eyewash should be available. Contact lenses should not be worn when working with this chemical.

Engineering Controls:

Use general or local exhaust ventilation to meet TLV requirements.

Special Precautions:

Trace quantities of ethylene oxide (EO) may be present in this product. While these trace quantities could accumulate in the headspace areas of storage transport vessels, they are not expected to create a condition which will result in EO concentration greater than 0.5 ppm (8 hour TWA) in the breathing zone of the workplace for appropriate applications. OSHA has established a permissible exposure limit of 1.0 ppm 8 hour TWA for EO.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Liquid
Appearance:	Colorless
Odor:	Sweet
Flash Point – Closed Cup:	116°C 241°F <i>Tag Closed Cup ASTM D 56</i>
Flammable Limits In Air:	
Lower	3.2%(V) appx
Upper	15.3%(V) Estimated
Autoignition Temperature:	400 °C 752 °F
Vapor Pressure:	0.06 mmHg 20 °C
Boiling Point (760 mmHg):	>197 °C >387 °F
Vapor Density (air = 1):	2.2
Specific Gravity (H ₂ O = 1):	1.115 20 °C / 20 °C
Freezing Point:	-13 °C 9 °F
Melting Point:	<i>Not applicable (for liquids)</i>
Solubility in Water (by weight):	100%
Molecular Weight:	63 g/mol Approximately

Evaporation Rate: (butyl acetate = 1): 0.01

10. STABILITY AND REACTIVITY

Stability: Stable under normal conditions of use.

Incompatibility: Strong oxidizing agents, strong acids and polymerization catalysts. Contact of aqueous ethylene glycol solution with DC-energized silvered copper wires causes ignition of the latter. A mixture of phosphorus (V) sulfide, ethylene glycol, and hexane in a mantle-heated flask spontaneously overheated and exploded at an internal temperature of about 180°C. Mixing of equal weights of ethylene glycol and potassium dichromate at 100°C caused heat to evolve.

Hazardous Decomposition Acrid smoke and irritating fumes. Carbon monoxide and carbon dioxide

Products:

Hazardous Polymerization: Will not occur

11. TOXICOLOGICAL INFORMATION

ACUTE TOXICITY

Peroral Human; Lethal Dose; approximately 3 ounces (100 ml) (1/3 cup); (for ethylene glycol).

Peroral Rat; LD50 = > 6000 mg/kg; Based on information for component(s).

Percutaneous Rabbit; LD50 = > 22270 mg/kg

Inhalation Rat; LC50 = > 3.95 mg/l; Aerosol, 7 hours, (for ethylene glycol)

DEVELOPMENTAL TOXICITY

Based on animal studies, ingestion of very large amounts of ethylene glycol appears to be major and possibly only route of exposure to produce birth defects. Diethylene glycol has caused toxicity to the fetus and some birth defects at maternally toxic, high doses in animals. Other animal studies have not reproduced birth defects even at much higher

doses that caused severe maternal toxicity. For ethylene glycol;. Exposures by inhalation or skin contact, the primary routes of occupational exposure, had minimal effect on the fetus, in animal studies.

REPRODUCTIVE TOXICITY

Ingestion of large amounts of ethylene glycol and diethylene glycol has been shown to interfere with reproduction in animals.

CHRONIC TOXICITY AND CARCINOGENICITY

Ethylene glycol did not cause cancer in long-term animal studies. Diethylene glycol has been tested for carcinogenicity in animal studies and is not believed to pose a carcinogenic risk to man.

GENETIC TOXICOLOGY

In Vitro

For ethylene glycol and diethylene glycol;. In vitro mutagenicity studies were negative.

In Vivo

For ethylene glycol and diethylene glycol;. Animal mutagenicity studies were negative.

SIGNIFICANT DATA WITH POSSIBLE RELEVANCE TO HUMANS

Effects have been reported in the following organs:

For ethylene glycol:

Observations in humans include:

Nystagmus (involuntary eye movement).

Repeated excessive exposure may cause irritation of the upper respiratory tract.

12. ECOLOGICAL INFORMATION

12.1 ENVIRONMENTAL FATE

Based largely or completely on information for: Ethylene glycol. 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. 301 F) after 28 days: >94%.

12.2 ECOTOXICITY

Based largely or completely on information for: Ethylene glycol.

Toxicity to Micro-organisms

Bacterial/NA; 16 h; EC50

Result value: > 10000 mg/l

OSHA Hazard Communication Standard

This product is a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

Superfund Amendments and Reauthorization Act of 1986 Title III (Emergency Planning and Community Right to Know Act) Section 313

This product contains the following substances subject to the reporting requirements of Section 313 of Title III of the Superfund Amendments and Reauthorization Act 1986 and 40 CFR Part 372.

Component	CAS #	Amount
Ethylene glycol	107-21-1	99.5000%

Superfund Amendments and Reauthorization Act of 1986 Title III (Emergency Planning and Community Right to Know Act) Section 302

To the best of our knowledge this product does not contain chemicals at levels, which require reporting under this statute.

Superfund Amendments and Reauthorization Act of 1986 Title III (Emergency Planning and Community Right to Know Act) Section 311 And 312

Delayed (Chronic) Health Hazard : Yes
Fire Hazard : No
Immediate (Acute) Health Hazard : Yes
Reactive Hazard : No
Sudden Release of Pressure Hazard : No

Tonic Substances Control Act (TSCA)

All components of this product are on the TSCA inventory or are exempt from TSCA Inventory requirements.

CEPA – Domestic Substances List (DSL)

All substances contained in this product are listed on the Canadian Domestic Substances List (DSL) or are not required to be listed.

European Inventory of Existing Commercial Chemical Substances (EINECS)

The components of this product are on the EINECS Inventory or are exempt fro EINECS inventory requirements.

15.2 STATE / LOCAL

Pennsylvania (Worker And Community Right To Know Act): Pennsylvania Hazardous Substances List And/Or Pennsylvania Environmental Hazardous Substance List:

The following product components are cited in the Pennsylvania Hazardous Substances List and/or the Pennsylvania Environmental Substance List, and are present at levels which require reporting.

Component	CAS #	Amount
Ethylene glycol	107-21-1	99.5000%
Diethylene glycol	111-46-6	0.5000%

Pennsylvania (Worker And Community Right To Know Act): Pennsylvania Special Hazardous Substances List:

To the best of our knowledge this product does not contain chemicals at levels which require reporting under this statute.

California Proposition 65 (Safe Drinking Water And Toxic Enforcement Act Of 1986)

Meets current guidelines of allowable limits as of the July 11, 2003 listing.

Component	CAS #	Amount
1,4-Dioxane	123-91-1	<0.000075%
Acetaldehyde	75-07-0	<0.00038%

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

VOC: Vapor pressure 0.06 mmHg at 20 °C
1113.38 g/l

16. OTHER INFORMATION

NFPA ratings for this product are: H - 1 F - 1 R - 0

Contact: Karen Engelbrecht Phone: (847) 559-2000

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