

Product Code: 6150
ETHYLENE GLYCOLUNION CARBIDE CHEMICALS AND PLASTICS COMPANY INC.
Industrial Chemicals Division

MATERIAL SAFETY DATA SHEET

EFFECTIVE DATE: 03/21/90

Union Carbide urges each customer or recipient of this MSDS to study it carefully to become aware of and understand the hazards associated with the product. The reader should consider consulting reference works or individuals who are experts in ventilation, toxicology, and fire prevention, as necessary or appropriate to use and understand the data contained in this MSDS.

To promote safe handling, each customer or recipient should: (1) notify its employees, agents, contractors and others whom it knows or believes will use this material of the information in this MSDS and any other information regarding hazards or safety; (2) furnish this same information to each of its customers for the product; and (3) request its customers to notify their employees, customers, and other users of the product of this information.

I. IDENTIFICATION

PRODUCT NAME: ETHYLENE GLYCOL, INDUSTRIAL GRADE

CHEMICAL NAME: Ethylene Glycol

CHEMICAL FAMILY: Glycols

FORMULA: HOC₂H₄OH

MOLECULAR WEIGHT: 62.07

SYNONYMS: EG; Glycol; 1,2-Ethanediol

CAS # and 107-21-1

CAS NAME: 1,2-Ethanediol

II. PHYSICAL DATA (Determined on typical material)

BOILING POINT, 760 mm Hg: >197C (>387F)

FREEZING POINT: -13 C (9 F)

SPECIFIC GRAVITY (H₂O = 1):
1.115 at 20/20 CVAPOR PRESSURE AT 20°C:
0.08 mm HgVAPOR DENSITY (air = 1):
2.1SOLUBILITY IN WATER by wt:
100EVAPORATION RATE
(Butyl Acetate = 1): 0.01

APPEARANCE AND ODOR: Colorless liquid. A slight sweet odor may be detected.

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EMERGENCY PHONE NUMBER: 1-800-UGC-HELP (Number available at all times)

UNION CARBIDE CHEMICALS AND PLASTICS COMPANY INC.
Industrial Chemicals Division
39 Old Ridgebury Road, Danbury, CT. 06817-0001

PRODUCT NAME: ETHYLENE GLYCOL, INDUSTRIAL GRADE

III. INGREDIENTS

| MATERIAL | % | TLV (Units) | HAZARD |
|------------------------------------|-----|--------------------------|---------------|
| Ethylene Glycol (CAS# 107-21-1) | 100 | 50ppm C, OSHA & ACGIH | See Section V |

IV. FIRE AND EXPLOSION HAZARD DATA

FLASH POINT:
(test method(s)): 241 F, Tag closed cup, ASTM D 56
240 F, Cleveland open cup, ASTM D 92

FLAMMABLE LIMITS IN AIR,
% by volume: LOWER: 3.2 Calculated
UPPER: 15.3 (Estimated)

EXTINGUISHING MEDIA: Apply alcohol-type or all-purpose-type foams by manufacturers' recommended techniques for large fires. Use water spray, CO2 or dry chemical media for small fires.

SPECIAL FIRE FIGHTING PROCEDURES: Do not spray pool fires directly; a solid stream of water or foam directed into hot burning liquid can cause frothing. Use self-contained breathing apparatus and protective clothing.

UNUSUAL FIRE AND EXPLOSION HAZARDS: None

V. HEALTH HAZARD DATA

TLV AND SOURCE: See Section III.

EFFECTS OF SINGLE OVEREXPOSURE:

SWALLOWING: May cause abdominal discomfort or pain, nausea, vomiting, dizziness, drowsiness, malaise, blurring of vision, irritability, lumbar pain, oliguria, uremia, and central nervous system effects, including irregular eye movements, convulsions and coma. Cardiac failure and pulmonary edema may develop. Severe kidney damage follows the swallowing of large volumes of ethylene glycol. May be fatal. A few reports have been published describing the development of weakness of the facial muscles, diminished hearing, and difficulty with swallowing, during the late stages of severe poisoning.

SKIN ABSORPTION: No evidence of adverse effects from available information.

INHALATION: May cause irritation of the nose and throat with headache, particularly from mists. High vapor concentrations caused, for example, by heating the material in an enclosed and poorly ventilated workplace, may produce nausea, vomiting, headache, dizziness, and irregular eye movements.

SKIN CONTACT: No evidence of adverse effects from available information.

EYE CONTACT: Liquid, vapor, and mist, may cause discomfort in the eye with persistent conjunctivitis, seen as slight excess redness of conjunctiva. Serious corneal injury is not anticipated.

EFFECTS OF REPEATED OVEREXPOSURE: Inhalation of mist may produce signs of central nervous system involvement, particularly dizziness and nystagmus.

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MEDICAL CONDITIONS AGGRAVATED BY OVEREXPOSURE:

May aggravate existing kidney disease.

SIGNIFICANT LABORATORY DATA WITH POSSIBLE RELEVANCE TO HUMAN

HEALTH HAZARD EVALUATION: Ethylene Glycol has been shown to produce dose-related teratogenic effects in

rats and mice when given by gavage or in drinking water at high concentrations or doses. The no-effect dose for developmental toxicity for ethylene glycol given by gavage over the period of organogenesis has been shown to be 150 mg/kg/day for the mouse and 500 mg/kg/day for the rat. Also in a preliminary study to assess the effects of exposure of pregnant rats and mice to aerosols at concentrations 150, 1000 and 2500 mg/m³ for 6 hours a day throughout the period of organogenesis, teratogenic effects were produced at the highest concentration, but only in mice. The conditions of these latter experiments did not allow a conclusion as to whether the developmental toxicity was mediated by inhalation of aerosol, percutaneous absorption of ethylene glycol from contaminated skin, or swallowing of ethylene glycol as a result of grooming the wetted coat. In a further study, comparing effects from high aerosol concentration by whole-body or nose-only exposure, it was shown that nose-only exposure resulted in maternal toxicity (1000 and 2500 mg/m³) and developmental toxicity with minimal evidence of teratogenicity (2500 mg/m³). The no-effects concentration (based on maternal toxicity) was 500 mg/m³. In a further study in mice, no teratogenic effects could be produced when ethylene glycol was applied to the skin of pregnant mice over the period of organogenesis. The above observations suggest that ethylene glycol is to be regarded as an animal teratogen; there is currently no available information to suggest that ethylene glycol has caused birth defects in humans. Cutaneous application of ethylene glycol is ineffective in producing developmental toxicity; exposure to high aerosol concentration is only minimally effective in producing developmental toxicity; the major route for producing developmental toxicity is perorally.

Two chronic feeding studies, using rats and mice, have not produced any evidence that ethylene glycol causes dose-related increases in tumor incidence, or a different pattern of tumors compared with untreated controls. The absence of a carcinogenic potential for ethylene glycol has been supported by numerous in vitro genotoxicity studies showing that it does not produce mutagenic or clastogenic effects.

OTHER EFFECTS OF OVEREXPOSURE:

Repeated skin contact may, in a very small proportion of cases, cause sensitization with the development of allergic contact dermatitis. The incidence is significantly less than 1% with the undiluted material.

EMERGENCY AND FIRST AID PROCEDURES:

SWALLOWING:

If conscious, give two glasses of water and induce vomiting. Call a physician immediately. If medical advice is delayed, and the person has swallowed moderate volumes of ethylene glycol (a few ounces), then give three to four ounces of hard liquor such as whiskey.

SKIN:

Remove contaminated clothing and flush skin with water.

INHALATION:

Remove to fresh air. Call a physician if discomfort persists.

EYES:

Immediately flush with water, and continue washing the eyes for several minutes.

NOTES TO PHYSICIAN:

The principal toxic effects of ethylene glycol, when swallowed, are kidney damage and metabolic acidosis. Ethanol is antidotal, and its early administration may block the formation of nephrotoxic metabolites of ethylene glycol in the liver. Ethanol should be given intravenously, as a 5% solution in sodium bicarbonate, at a rate of about 10 ml ethanol per hour. A desired therapeutic level of ethanol in blood is 100 mg/dl. Hemodialysis may be required. 4-Methylpyrazole, a potent inhibitor of alcohol dehydrogenase, has been used therapeutically to decrease the metabolic consequences of ethylene glycol poisoning before coma, seizure, and renal failure have occurred (20 mg/kg/day).

Pulmonary edema with hypoxemia has been described in a number of patients following poisoning with ethylene glycol. The mechanism of production has not been elucidated, but it appears to be noncardiogenic in origin in several cases. Respiratory support with mechanical ventilation and positive end-expiratory pressure may be required. There may be cranial nerve involvement in the late stages of toxicity from

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swallowed ethylene glycol. In particular, effects have been reported involving the seventh, eighth and ninth cranial nerves, presenting with bilateral facial paralysis, diminished hearing, and dysphagia.

VI. REACTIVITY DATA

STABILITY: Stable

CONDITIONS TO AVOID: None

INCOMPATIBILITY (materials to avoid):

Explosive decomposition may occur if combined with strong acids or strong bases and subjected to elevated temperatures. Therefore, avoid strong acids and strong bases at elevated temperatures. Avoid contamination with strong oxidizing agents and materials reactive with hydroxyl compounds.

HAZARDOUS COMBUSTION OR DECOMPOSITION PRODUCTS:

Burning can produce carbon monoxide and/or carbon dioxide.

HAZARDOUS POLYMERIZATION: Will Not Occur

CONDITIONS TO AVOID: None

VII. SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED:

Wear suitable protective equipment. Small spills should be flushed with large quantities of water. Larger spills should be collected for disposal.

WASTE DISPOSAL METHOD: Incinerate in a furnace where permitted under appropriate Federal, State, or local regulations. At very low concentration in water, ethylene glycol is readily biodegradable in a biological wastewater treatment plant.

VIII. SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION (specify type):

NIOSH approved breathing air equipment or NIOSH approved face mask with organic vapor cartridge and dust or mist pre-filter (not for use in fire fighting or in atmospheres with reduced oxygen content).

VENTILATION:

General (mechanical) room ventilation may be adequate if handled at ambient temperatures or in covered equipment. If ambient temperatures are exceeded or operations exist which may produce misting, local exhaust ventilation is needed.

PROTECTIVE GLOVES:

Rubber or polyvinyl chloride coated.

EYE PROTECTION:

Monogoggles or faceshield.

OTHER PROTECTIVE EQUIPMENT:

Eye bath and safety shower.

IX. SPECIAL PRECAUTIONS

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PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE:

DANGER!! Harmful or fatal if swallowed.
 Prolonged or repeated breathing of mist or vapor harmful.
 Causes eye irritation.
 May cause kidney and nervous system damage.
 Causes birth defects in laboratory animals.

Do not swallow.
 Do not breathe the mist from spray.
 Avoid prolonged or repeated breathing of vapor.
 Avoid contact with eyes.
 Keep container closed.
 Use with adequate ventilation.
 Wash thoroughly after handling.

FOR INDUSTRY USE ONLY

OTHER PRECAUTIONS:

WARNING: Hot organic chemical vapors or mists are susceptible to sudden spontaneous combustion when mixed with air. Ignition may occur at temperatures below those published in the literature as "autoignition" or "ignition" temperatures. Ignition temperatures decrease with increasing vapor volume and vapor/air contact time, and are influenced by pressure changes.

Ignition may occur at typical elevated-temperature process conditions, especially in processes operating under vacuum if subjected to sudden ingress of air, or outside process equipment operating under elevated pressure if sudden escape of vapors or mists to the atmosphere occurs.

Any proposed use of this product in elevated-temperature processes should be thoroughly evaluated to assure that safe operating conditions are established and maintained.

X. REGULATORY INFORMATION

STATUS ON SUBSTANCE LISTS:

The concentrations shown are maximum or ceiling levels (weight %) to be used for calculations for regulations. Trade Secrets are indicated by "TS".

FEDERAL EPA

Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) requires notification of the National Response Center of release of quantities of Hazardous Substances equal to or greater than the reportable quantities (RQs) in 40 CFR 302.4.

Components present in this product at a level which could require reporting under the statute are:

| CHEMICAL | CAS NUMBER | UPPER BOUND CONCENTRATION % |
|----------------|------------|--------------------------------|
| Dioxane | 123-91-1 | .0026 |
| Ethylene Oxide | 75-21-8 | .0001 |

Superfund Amendments and Reauthorization Act of 1986 (SARA) Title III

requires emergency planning based on Threshold Planning Quantities (TPQs) and release reporting based on Reportable Quantities (RQs) in 40 CFR 355 (used for SARA 302, 304, 311 and 312).

Components present in this product at a level which could require reporting under the statute are:

*** NONE ***

Superfund Amendments and Reauthorization Act of 1986 (SARA) Title III

requires submission of annual reports of release of toxic chemicals that appear in 40 CFR 372 (for SARA 313). This information must be included in all MSDSs that are copied and distributed for this material.

Components present in this product at a level which could require reporting under the statute are:

| CHEMICAL | CAS NUMBER | UPPER BOUND CONCENTRATION % |
|-----------------|------------|--------------------------------|
| Ethylene Glycol | 107-21-1 | 100.0 |

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STATE RIGHT-TO-KNOW

CALIFORNIA Proposition 65

This product contains trace levels of ACETALDEHYDE AND DIOXANE which the State of California has found to cause cancer, birth defects or other reproductive harm.

MASSACHUSETTS Right-To-Know, Substance List (MSL) Hazardous Substances and Extraordinarily Hazardous Substances on the MSL must be identified when present in products.

Components present in this product at a level which could require reporting under the statute are:

EXTRAORDINARILY HAZARDOUS SUBSTANCES (\Rightarrow 0.0001%)

| CHEMICAL | CAS NUMBER | UPPER BOUND CONCENTRATION % |
|----------|------------|--------------------------------|
| Dioxane | 123-91-1 | .0026 |
| Methanol | 67-56-1 | .0024 |

HAZARDOUS SUBSTANCES (\Rightarrow 1%)

| CHEMICAL | CAS NUMBER | UPPER BOUND CONCENTRATION % |
|-----------------|------------|--------------------------------|
| Ethylene Glycol | 107-21-1 | 100.0 |

PENNSYLVANIA Right-To-Know, Hazardous Substance List Hazardous Substances and Special Hazardous Substances on the List must be identified when present in products.

Components present in this product at a level which could require reporting under the statute are:

HAZARDOUS SUBSTANCES (\Rightarrow 1%)

| CHEMICAL | CAS NUMBER | UPPER BOUND CONCENTRATION % |
|-----------------|------------|--------------------------------|
| Ethylene Glycol | 107-21-1 | 100.0 |

Toxic Substances Control Act(TSCA) STATUS:

The ingredients of this product are on the TSCA inventory.

CALIFORNIA SCAQMD RULE 443.1 VOC'S:

Not presently available

NOTE ----

The opinions expressed herein are those of qualified experts within Union Carbide Chemicals and Plastics Company. We believe that the information contained herein is current as of the date of this Material Safety Data Sheet. Since the use of this information and of these opinions and the conditions of the use of the product are not within the control of Union Carbide Chemicals and Plastics Company, it is the user's obligation to determine the conditions of safe use of the product.

REVISED SECTIONS:

Revisions in this MSDS occurred in the following sections:

Section II: PHYSICAL DATA (Subtitle: Appearance and Odor)

Section V: HEALTH HAZARD DATA (Subtitles):

Medical Conditions Aggravated By Overexposure

Significant Laboratory Data

Emergency and First Aid Procedures - "Swallowing"

Section X: Dioxane level

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