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Material Safety Data Sheets Collection

Diethylene Glycol

MSDS No. 399

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Section 1 - Chemical Product and Company Identification

44

Product/Chemical Name: Diethylene Glycol

Chemical Formula: O(CH₂CH₂OH)₂

CAS No.: 111-46-6

Synonyms: bis(2-hydroxyethyl)ether; DEG; dihydroxydiethyl ether; 2,2'-oxydiethanol; 3-oxa-1,5-pentanediol.

Derivation: As a byproduct of ethylene glycol production or directly by reaction between ethylene glycol and ethylene oxide.

General Use: Used for dehydration of natural gas, plasticizers, and surfactants; solvent for nitrocellulose, dyes, and oils; humectant for tobacco, casein, synthetic sponges, and paper products; in production of polyurethane and saturated polyester resins; as a textile softener; in petroleum extraction, antifreeze solutions, cork compositions, brake fluids, lubricants, inks, mold-release agents, and book-binding adhesives.

Vendors: Consult the latest *Chemical Week Buyers' Guide*. (73)

Section 2 - Composition / Information on Ingredients

Diethylene Glycol, ca 100% vol

OSHA PELs*

None established

ACGIH TLVs

None established

NIOSH REL

None established

DFG (Germany) MAK

None established

* Consider the United Kingdom's OEL: TWA = 23 ppm (100 mg/m³) as a guideline.

Section 3 - Hazards Identification

☆☆☆☆☆ Emergency Overview ☆☆☆☆☆

Diethylene glycol is an odorless, colorless, hygroscopic, syrupy liquid. It does not normally present an inhalation hazard because of its extremely low vapor pressure at room temperature. However, if heated or misted, inhalation could pose a problem. Prolonged skin contact can be irritating. The primary health hazard from diethylene glycol is associated with ingestion of large quantities. However, this should not occur in an industrial setting unless containers are mislabeled or unlabeled. Central nervous system (CNS) effects along with kidney and liver damage are common. Diethylene glycol presents a fire hazard at elevated temperatures.

**Wilson
Risk
Scale**

R 1
I 1
S 1
K 1

Potential Health Effects

Primary Entry Routes: Ingestion, skin contact.

Target Organs: CNS, kidneys, liver, skin.

Acute Effects

Inhalation: Inhalation does not occur unless diethylene glycol is heated or misted. If this occurs, then pulmonary edema (fluid in lungs) is possible.

Eye: Mild irritation may occur.

Skin: Mild irritation is possible. If contact is prolonged, diethylene glycol could produce a macerating action (softening, reddening and gradual disintegration) like that caused by glycerol.

Ingestion: Symptoms include thirst, appetite loss, nausea and vomiting, headache, hypothermia, delayed drowsiness (24 hr), unconsciousness, kidney damage shown by decreased and eventually absent urination, and liver damage with possible jaundice or enlarged liver. Death is almost always due to kidney failure.

Carcinogenicity: IARC, NTP, and OSHA do not list diethylene glycol as a carcinogen.

Medical Conditions Aggravated by Long-Term Exposure: Kidney and liver disorders.

Chronic Effects: None reported.

HMIS

H 1
F 1
R 0

PPE*

*Sec. 8

Section 4 - First Aid Measures

Inhalation: Remove exposed person to fresh air and support breathing as needed.

Eye Contact: Do not allow victim to rub or keep eyes tightly shut. Gently lift eyelids and flush immediately and continuously with flooding amounts of water until transported to an emergency medical facility. Consult a physician immediately.

Skin Contact: Quickly remove contaminated clothing. Rinse with flooding amounts of water for at least 15 min. Wash exposed area with soap and water. For reddened or blistered skin, consult a physician.

Ingestion: Never give anything by mouth to an unconscious or convulsing person. Contact a poison control center. Unless the poison control center advises otherwise, have the conscious and alert person drink 1 to 2 glasses of water, then induce vomiting. Emesis (vomiting) is most effective within 30 minutes of ingestion.

After first aid, get appropriate in-plant, paramedic, or community medical support.

Note to Physicians: Leukocytosis is a common symptom of heavy exposure. Pericardial hemorrhage into the digestive tract and lungs is a possible complication.

Section 5 - Fire Fighting Measures

Flash Point: 255 °F (124 °C)

Flash Point Method: OC

Burning Rate: 1.5 mm/min.

Autoignition Temperature: 435 °F (224 °C)

LEL: 1.6 % v/v

UEL: 10.8 % v/v

Flammability Classification: Class IIIB Combustible Liquid.

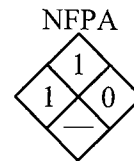
Extinguishing Media: Use alcohol foam, dry chemical, and carbon dioxide. Water may cause frothing, so use with caution.

Unusual Fire or Explosion Hazards: None reported.

Hazardous Combustion Products: Acrid smoke and carbon dioxide gas.

Fire-Fighting Instructions: Do not release runoff from fire control methods to sewers or waterways.

Fire-Fighting Equipment: Because fire may produce toxic thermal decomposition products, wear a self-contained breathing apparatus (SCBA) with a full facepiece operated in pressure-demand or positive-pressure mode.



Section 6 - Accidental Release Measures

Spill/Leak Procedures: Notify safety personnel, isolate and ventilate area, deny entry, and stay upwind. Shut off ignition sources.

Small Spills: Take up with earth, sand, vermiculite, or other absorbent, noncombustible materials and place in suitable container.

Large Spills

Containment: For large spills, dike far ahead of liquid spill for later disposal. Do not release into sewers or waterways.

Cleanup: If spilled in water, aeration may aid in biodegradation. Carbon may be ineffective.

Regulatory Requirements: Follow applicable OSHA regulations (29 CFR 1910.120).

Section 7 - Handling and Storage

Handling Precautions: Use non-sparking tools to open containers.

Storage Requirements: Store in a cool, dry, well-ventilated area away from heat, ignition sources, and incompatibles.

Section 8 - Exposure Controls / Personal Protection

Engineering Controls: To prevent static sparks, electrically ground and bond all equipment used with and around diethylene glycol.

Ventilation: Provide general or local exhaust ventilation systems (especially if diethylene glycol is heated or misted) to maintain airborne concentrations below OSHA PELs (Sec. 2). Local exhaust ventilation is preferred because it prevents contaminant dispersion into the work area by controlling it at its source.⁽¹⁰³⁾

Administrative Controls: Consider preplacement and periodic medical exams of exposed workers with emphasis on the liver and kidneys.

Respiratory Protection: Seek professional advice prior to respirator selection and use. Follow OSHA respirator regulations (29 CFR 1910.134) and, if necessary, wear a MSHA/NIOSH-approved respirator. Select respirator based on its suitability to provide adequate worker protection for given working conditions, level of airborne contamination, and presence of sufficient oxygen. For emergency or nonroutine operations (cleaning spills, reactor vessels, or storage tanks), wear an SCBA. *Warning! Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.* If respirators are used, OSHA requires a written respiratory protection program that includes at least: medical certification, training, fit-testing, periodic environmental monitoring, maintenance, inspection, cleaning, and convenient, sanitary storage areas.

Protective Clothing/Equipment: Wear chemically protective gloves, boots, aprons, and gauntlets to prevent prolonged or repeated skin contact. Wear protective eyeglasses or chemical safety goggles, per OSHA eye- and face-protection regulations (29 CFR 1910.133). Because contact lens use in industry is controversial, establish your own policy.

Safety Stations: Make available in the work area emergency eyewash stations, safety/quick-drench showers, and washing facilities.

Contaminated Equipment: Separate contaminated work clothes from street clothes. Launder before reuse. Remove diethylene glycol from your shoes and clean personal protective equipment.

Comments: Never eat, drink, or smoke in work areas. Practice good personal hygiene after using diethylene glycol, especially before eating, drinking, smoking, using the toilet, or applying cosmetics.

Section 9 - Physical and Chemical Properties

Physical State: Liquid

Appearance and Odor: An odorless, colorless, hygroscopic, syrupy liquid with a sweet initial taste and bitter aftertaste.

Vapor Pressure: 0.01 mm Hg at 86 °F (30 °C)

% In Saturated Air: 0.0013 at 68 °F (20 °C)

Formula Weight: 106.1

Density: 1.1184 g/L at 68 °F (20 °C)

Water Solubility: Soluble

Wt/Gal: 9.35 at 95 °F (35 °C)

Other Solubilities: Soluble in ethanol, ether, and acetone. Insoluble in fatty oils, aliphatic hydrocarbons, toluene, benzene, and carbon tetrachloride.

Boiling Point: 472 °F (244 °C)

Freezing Point: 20.3 °F (-6.5 °C)

Viscosity: 0.30 P at 77 °F (25 °C)

Refraction Index: 1.446 at 77 °F (25 °C)

Surface Tension: 48.5 dyne/cm at 77 °F (25 °C)

Critical Temperature: 766 °F (408 °C)

Critical Pressure: 46 atm

Section 10 - Stability and Reactivity

Stability: Diethylene glycol is stable at room temperature in closed containers under normal storage and handling conditions.

Polymerization: Hazardous polymerization does not occur.

Chemical Incompatibilities: Include oxidizers and sodium hydroxide (when heated it emits explosive hydrogen gas).

Conditions to Avoid: Exposure to heat, ignition sources, and incompatibles.

Hazardous Decomposition Products: Thermal oxidative decomposition of diethylene glycol can produce acrid smoke and carbon dioxide gas.

Section 11- Toxicological Information

Toxicity Data:*

Eye Effects:

Rabbit, eye: 50 mg caused mild irritation.

Skin Effects:

Human, skin: 112 mg applied intermittently for 3 days caused mild irritation.

Teratogenicity: Rat, oral, TD_{Lo}: 50 g/kg given from 1 to 20 days of pregnancy caused specific developmental abnormalities of the musculoskeletal system.

Acute Oral Effects:

Rat, oral, LD₅₀: 12565 mg/kg

Child, oral, TD_{Lo}: 2400 mg/kg caused general depressed activity, liver changes, and metabolic acidosis.

Human, oral, LD_{Lo}: 1 g/kg

* See NIOSH, RTECS (ID5950000), for additional toxicity data.

Section 12 - Ecological Information

Ecotoxicity: Mosquito fish, TL_m = >32,000 ppm/96 hr.

Environmental Degradation: BOD = 6% (5 days)

Section 13 - Disposal Considerations

Disposal: Atomize in an incinerator (permit-approved facilities only). Combustion may be improved by addition of a more flammable solvent. Contact your supplier or a licensed contractor for detailed recommendations. Follow applicable Federal, state, and local regulations.

Section 14 - Transport Information

DOT Transportation Data (49 CFR 172.101): Not listed

Section 15 - Regulatory Information

EPA Regulations:

RCRA Hazardous Waste Number (40 CFR 261.33): Not listed

CERCLA Hazardous Substance (40 CFR 302.4): Not listed

SARA Toxic Chemical (40 CFR 372.65): Not listed

SARA EHS (Extremely Hazardous Substance) (40 CFR 355): Not listed

OSHA Regulations:

Air Contaminant (29 CFR 1910.1000, Table Z-1, Z-1-A): Not listed

Section 16 - Other Information

References: 73, 103, 124, 126, 127, 132, 133, 136, 139, 149, 159, 168

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