Brenntag Canada Inc.

BRENNTAG

MATERIAL SAFETY DATA SHEET

TRIETHYLENE GLYCOL (ALL GRADES)

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1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Brenntag Canada Inc.
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WHMIS Number: 00060866
Index: GCD1354/06A
Effective Date: 2005 March 30
Date of Revision: 2006 January 20
Website: http://www.brenntag.ca

EMERGENCY TELEPHONE NUMBERS (FOR EMERGENCIES INVOLVING CHEMICAL SPILLS OR RELEASE)

Toronto, ON (416) 226-6117	Montreal, QC (514) 861-1211	Winnipeg, MB (204) 943-8827
Edmonton, AB (780) 424-1754	Calgary, AB (403) 263-8660	Vancouver, BC (604) 685-5036

PRODUCT IDENTIFICATION

Product Name: Triethylene Glycol (All Grades).
Chemical Name: Triethylene Glycol.
Synonyms: 2,2-(1,2-ethanediylbis(oxy))bis-ethanol; TEG 50 - 100 %; Triglycol.
Chemical Family: Glycols.
Molecular Formula: C6H14O4; HO(CH2-CH2-O-)3H.
Product Use: Heat transfer fluid. Plasticizer in plastics, adhesives and coatings. Industrial solvent, cleaner, degreaser.
CAS #: 112-27-6.
WHMIS Classification / Symbol: Not regulated. / Not required.

Glycols are not intended for the production of theatrical fog or artificial smoke. The normal use of glycols in the workplace usually includes preventative measures to reduce or minimize personnel contact. Such measures may not be consistent with theatrical or entertainment settings where these special effects may be produced.

READ THE ENTIRE MSDS FOR THE COMPLETE HAZARD EVALUATION OF THIS PRODUCT.

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2. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW: Low hazard for usual industrial or commercial handling. Mists or sprays are irritating to eyes and respiratory tract. See "Other Health Effects" Section. Can decompose at high temperatures forming toxic gases. Contents may develop pressure on prolonged exposure to heat.

POTENTIAL HEALTH EFFECTS

. Inhalation: This product has a low vapour pressure and is not expected to present an inhalation hazard at ambient conditions. Prevent aerosolization or misting of this product. (3) Vapours from warmed or heated material may be a mild respiratory irritant. See "Other Health Effects" Section.

. Skin Contact: At ambient temperatures: This product is non-irritating upon contact. Prolonged, confined (especially under the finger nails, under rings or watch bands) or repeated exposure may cause skin irritation. May cause defatting, drying and cracking of the skin. Prolonged and repeated contact may lead to dermatitis. At elevated temperatures: Burns (thermal) can occur if not promptly removed.

. Skin Absorption: At ambient temperatures: A single, prolonged skin exposure is not likely to result in the absorption of toxic amounts of the material. At elevated temperatures: May cause more severe response if skin is abraded (scratched, scraped or cut).

. Eye Contact: At ambient temperatures: This product may cause mild, transient irritation. Splashes to the eye may cause irritation, redness and pain. May cause lachrymation (excessive tears). At elevated temperatures: Vapours from this product are irritating to the eyes. Burns (thermal) can occur if not promptly removed.

. Ingestion: Ingestion of large amounts may cause nausea, gastrointestinal upset and abdominal pain.

Other Health Effects: Prolonged and repeated exposure may cause central nervous system (CNS) depression, liver damage, acidosis and kidney damage. CNS depression is characterized by headache, dizziness, drowsiness, nausea, vomiting and incoordination. Severe overexposures may lead to coma and possible death due to respiratory failure. Liver damage is characterized by the loss of appetite, jaundice (yellowish skin colour), and occasional pain in the upper left-hand side of the abdomen. Metabolic acidosis is a condition that describes a decreased pH and bicarbonate concentration in the body fluids. Signs and symptoms of kidney damage generally progress from oliguria, to blood in the urine, to total renal failure.

Metabolic abnormalities can occur following ingestion and include ethanol-like inebriation. (3)

3. COMPOSITION, INFORMATION ON INGREDIENTS (Not Intended As Specifications)

Hazardous Ingredients: None according to Controlled Products Regulations.

Non-Hazardous Ingredients	CAS No.	ACGIH TLV	%
Triethylene Glycol	000112-27-6	Not Listed.	50 - 100
Water	007732-18-5	Not Listed.	Balance.

4. FIRST AID MEASURES

FIRST AID PROCEDURES

. Inhalation: If respiratory problems arise, move the victim to fresh air. Give artificial respiration ONLY if breathing has stopped. Give cardiopulmonary resuscitation (CPR) if there is no breathing AND no pulse. Obtain medical advice IMMEDIATELY.

. Skin Contact: Start flushing while removing contaminated clothing. Wash affected areas thoroughly with soap and water. If irritation, redness, or a burning sensation develops and persists and obtain medical advice. At elevated temperatures: See "Note to Physicians" below.

. Eye Contact: Immediately flush eyes thoroughly for 5 minutes with running water. Hold eyelids open during flushing. If irritation persists, repeat flushing. Obtain medical attention. At elevated temperatures: See "Note to Physicians" below.

. Ingestion: Do not attempt to give anything by mouth to an unconscious person. If victim is alert and not convulsing, rinse mouth out and give 1/2 to 1 glass of water to dilute material. IMMEDIATELY contact local Poison Control Centre. Vomiting should only be induced under the direction of a physician or a poison control centre. If spontaneous vomiting occurs, have victim lean forward with head down to avoid breathing in of vomitus, rinse mouth and administer more water. IMMEDIATELY transport victim to an emergency facility.

Note to Physicians: This product contains materials that may cause severe pneumonitis if aspirated. If ingestion has occurred less than 2 hours earlier, carry out careful gastric lavage; use endotracheal cuff if available, to prevent aspiration. Observe patient for respiratory difficulty from aspiration pneumonitis. Give artificial resuscitation and appropriate chemotherapy if respiration is depressed.

Treatment for thermal, surface burns:

1. Immerse the burned part immediately in ice water to relieve pain and to prevent swelling and blistering. Place cold packs, ice or wet cloths on the burned area if immersion is

not possible.
2. Remove anything that is constrictive, such as rings, bracelets or footwear, before swelling begins.
3. Cover the burn with a clean, preferably sterile, lint-free dressing.
4. For severe burns, immediately seek medical attention and monitor breathing and treat for shock.

Medical conditions that may be aggravated by exposure to this product include neurological and cardiovascular disorders, diseases of the skin, eyes or respiratory tract, preexisting liver and kidney disorders.

5. FIRE FIGHTING MEASURES

FLAMMABLE PROPERTIES

Flammability Class (WHMIS): Not regulated.
Flash Point (TCC, Deg. Celsius): 166 to 177. (3,4)
Autoignition Temperature (Deg. Celsius): 323. (3)
Flammability Limits in Air (%): LEL: 0.9. (3) UEL: 9.2. (3)

Hazardous Combustion Products: Thermal decomposition products are toxic and may include oxides of carbon and irritating gases. Heating in air may produce irritating aldehydes, acids and ketones.

Unusual Fire or Explosion Hazards: Do not direct a solid stream of foam into hot, burning pools. This may cause spattering and increase fire intensity. Closed containers exposed to heat may explode. Spilled material may cause floors and contact surfaces to become slippery.

Spills on hot fibrous insulation may lead to the lowering of the autoignition temperature possibly resulting in spontaneous combustion.

Sensitivity to Mechanical Impact: Not expected to be sensitive to mechanical impact.
Rate of Burning: 1.7 mm/min. (4)
Explosive Power: Not available.
Sensitivity to Static Discharge: Expected to be sensitive to static discharge when vapours are present between the lower and upper explosive limits.

EXTINGUISHING MEDIA

Fire Extinguishing Media: Alcohol resistant foam. Use carbon dioxide or dry chemical media for small fires. If only water is available, use it in the form of a fog. Do not use high volume water jet.

FIRE FIGHTING INSTRUCTIONS

Instructions to the Fire Fighters: Use water spray to cool fire-exposed containers or structures. Use water spray to disperse vapours.

Fire Fighting Protective Equipment: Use self-contained breathing apparatus and protective clothing.

6. ACCIDENTAL RELEASE MEASURES

Information in this section is for responding to spills, leaks or releases in order to prevent or minimize the adverse effects on persons, property and the environment. There may be specific reporting requirements associated with spills, leaks or releases, which change from region to region.

Containment and Clean-Up Procedures: In all cases of leak or spill contact vendor at Emergency Number shown on the front page of this MSDS. Wear protective clothing. Recover spilled material on non-combustible absorbents, such as sand or vermiculite, and place in covered containers for disposal. Use spark-resistant tools. Eliminate all sources of ignition. Collect product for recovery or disposal. For release to land, or storm water runoff, contain discharge by constructing dykes or applying inert absorbent; for release to water, utilize damming and/or water diversion to minimize the spread of contamination.

Ventilate enclosed spaces. Notify applicable government authority if release is reportable or could adversely affect the environment.

7. HANDLING AND STORAGE

HANDLING

Handling Practices: Use normal "good" industrial hygiene and housekeeping practices. Containers exposed to heat may be under internal pressure. These should be cooled and carefully vented before opening. A face shield and apron should be worn.

Ventilation Requirements: See Section 8, "Engineering Controls".

Other Precautions: Use only with adequate ventilation and avoid breathing aerosols (vapours or mists). Avoid contact with eyes, skin or clothing. Wash thoroughly with soap and water after handling. Wash contaminated clothing thoroughly before re-use.

STORAGE

Storage Temperature (Deg Celsius): See below. Do not freeze. Do not store above 60 (Maximum). (3)

Ventilation Requirements: General exhaust is acceptable.

Storage Requirements: Store in a cool, well-ventilated area. Keep away from heat, sparks and flames. Keep containers closed. Do not expose sealed containers to temperatures above 40 Deg. Celsius. Avoid freezing! Protect from direct sunlight. Protect against physical damage.

Special Materials to be Used for Packaging or Containers: Materials of construction for storing the product include: mild steel or carbon steel. (3) Confirm suitability of any material before using.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Recommendations listed in this section indicate the type of equipment, which will provide protection against overexposure to this product. Conditions of use, adequacy of engineering or other control measures, and actual exposures will dictate the need for specific protective devices at your workplace.

ENGINEERING CONTROLS

Engineering Controls: General exhaust is acceptable. Local exhaust ventilation preferred. Make up air should be supplied to balance air that is removed by local or general exhaust ventilation. Ventilate low lying areas such as sumps or pits where dense vapours may collect.

PERSONAL PROTECTIVE EQUIPMENT (PPE)

Selection and use of PPE is dependant upon the nature, degree and extent of operations using this product or material.

Eye Protection: Safety glasses with side shields are recommended to prevent eye contact. Use chemical safety goggles when there is potential for eye contact. Contact lenses should not be worn when working with this material.

Skin Protection: Gloves and protective clothing made from butyl rubber or PVC should be impervious under conditions of use. Prior to use, user should confirm impermeability. Discard contaminated gloves. At elevated temperatures: Skin protection should be insulated against hot or high temperatures.

Respiratory Protection: No specific guidelines available. Respiratory protection should not be necessary unless the material is heated or a mist created. A NIOSH/MSHA-approved air-purifying respirator equipped with organic vapour cartridges for concentrations up to 1,000 ppm organic vapours. An air-supplied respirator if concentrations are higher or unknown.

If while wearing a respiratory protection, you can smell, taste or otherwise detect anything unusual, or in the case of a full facepiece respirator you experience eye irritation, leave the area immediately. Check to make sure the respirator to face seal is still good. If it is, replace the filter, cartridge or canister. If the seal is no longer good, you may need a new respirator. (4)

Other Personal Protective Equipment: Wear regular work clothing. The use of coveralls is recommended. Locate safety shower and eyewash station close to chemical handling area. Take all precautions to avoid personal contact.

EXPOSURE GUIDELINES

Triethylene Glycol: Manufacturer's Recommended Exposure Level: 100 mg/M3 (TWA) (3)

9. PHYSICAL AND CHEMICAL PROPERTIES (Not intended as Specifications)

Physical State: Liquid.
Appearance and Odour: Colourless liquid. Viscous liquid with a slight odour.
Odour Threshold (ppm): Not available.
Boiling Range (Deg Celsius): 100 to 286 (50 to 100 %)
Melting/Freezing Point (Deg Celsius): -7 to 0.
Vapour Pressure (mm Hg at 20 Deg. Celsius): Below 0.01.
Vapour Density (Air = 1.0): 5.2.
Relative Density (g/cc): 1.05 to 1.15.
Bulk Density: 1,050 to 1,150 Kg/M3.
Viscosity: 47.8 cPs. (4)
Evaporation Rate (Butyl Acetate = 1.0): Below 0.001.
Water Solubility: Soluble in water. Hygroscopic (readily absorbs water).
Solubility: Soluble in Ethyl Alcohol, Benzene and Toluene. Slightly soluble in Diethyl Ether. (4)
% Volatile by Volume: Negligible.
pH: 8.0.
Coefficient of Water/Oil Distribution: -1.24. (3)
Volatile Organic Compounds (VOC): 2 g/L. (3)

10. STABILITY AND REACTIVITY

CHEMICAL STABILITY

Under Normal Conditions: Stable.
Under Fire Conditions: Material will not burn unless preheated.
Hazardous Polymerization: Will not occur.

Conditions to Avoid: High temperatures, sparks, open flames and all other sources of ignition. Keep tightly closed to protect quality. Decomposes at 206 Degrees Celsius. (3) Keep from freezing.

Materials to Avoid: Strong oxidizers. Strong Acids. Sulphuric Acid. Strong bases. Isocyanates. Perchloric Acid. Materials reactive with hydroxyl bearing compounds.

Decomposition or Combustion Products: Thermal decomposition products are toxic and may include oxides of carbon and irritating gases. Heating in air may produce irritating aldehydes, acids and ketones.

11. TOXICOLOGICAL INFORMATION

Toxicological Data:

Triethylene Glycol	LD50 (Oral, Rat)	=	17,000 mg/Kg (1,3)
	LD50 (Oral, Rat)	=	2,206 mg/Kg (3)
	LD50 (Dermal, Rabbit)	=	Above 20,000 mg/Kg (1)

Carcinogenicity Data: The ingredient(s) of this product is (are) not classed as carcinogenic

by ACGIH, IARC, OSHA or NTP.
Reproductive Data: Reproductivity tests in animals have been negative.
Mutagenicity Data: No adverse mutagenic effects are anticipated.

Teratogenicity Data: Triethylene Glycol may cause teratogenic / embryotoxic effects based on studies in laboratory animals, but only at high, generally toxic doses.

Respiratory / Skin Sensitization Data: None known.

Synergistic Materials: Alcohols/Glycols: Alcohols may interact synergistically with chlorinated solvents (example - carbon tetrachloride, chloroform, bromotrichloromethane), dithiocarbamates (example - disulfiram), dimethylnitrosamine and thioacetamide. (4)

Other Studies Relevant to Material: Triethylene Glycol was given to rats by inclusion in the diet for 90 days at concentrations of 10,000, 20,000, or 50,000 ppm. At the highest dose, there were decreases in body weight. Physiologic responses to these high doses were observed in kidney weight and urinalysis. No specific organ toxicity was seen. (3)

In a 9-day (whole body) repeated exposure (6 h/day) study with rats, mortality occurred at 4,284 mg/M3 and effects included eye irritation and increased alanine aminotransferase and alkaline phosphatase activities; at 494 mg/M3, there was slightly increased alkaline phosphatase activity. (3)

In a subsequent 9-day (nose-only) repeated aerosol study, rats were exposed to concentrations up to 1,036 mg/M3. The only effect noted was slight (not statistically or biologically significant) decrease in body weight gain at 517 mg/M3 and 1,036 mg/M3, but not at 102 mg/M3. No indications of local or systemic target organ toxicity were noted, including effects on hematology, clinical chemistry or urinalysis. (3)

In a sensory irritation study in mice, exposure to high concentrations of Triethylene Glycol aerosol resulted in decreased respiratory rate. The RD50, or concentration that produced a 50% decrease in respiratory rate, was 5.1 mg/L. (3)

There was no evidence in developmental toxicity studies for either embryotoxic or teratogenic effects in mice or rats given Triethylene Glycol by gavage. Maternal toxicity was seen as reduced body weight and food consumption, increased water consumption and increased relative kidney weight with rats, and clinical signs and increased relative kidney weight with mice. (3)

There was no histologic evidence of damage to the kidneys in either species. The no-observable effects dose for maternal toxicity were 1,125 mg/Kg/day for rats and 5,630 mg/Kg/day for mice. Minor fetotoxicity (reduced fetal body weights and increased skeletal variations) was resent with doses of 11,260 mg/Kg/day for rats, 5,620 and 11,260 mg/Kg/day for mice. The no-observable effect dose for fetotoxicity was 5,630 mg/Kg/Day for rats and 563 mg/Kg/day for mice. (3)

12. ECOLOGICAL INFORMATION

Ecotoxicity: No adverse effect reported, toxicity to fish, aquatic species reported as negligible. (3)

48-hour LC50 (Daphnia) = Above 10,000 mg/L (3)
96-hour LC50 (Fathead Minnow) = Above 10,000 mg/L (3)

Environmental Fate: This product is biodegradable. No food chain concentration potential. (3) Do not contaminate domestic or irrigation water supplies, lakes, streams, ponds, or rivers. Triethylene Glycol has high mobility in soil. This product is estimated to have a low potential to bioconcentrate. (3) There is evidence of photodegradation in air. This material is not expected to bioaccumulate. (3)

Triethylene Glycol: Biochemical Oxygen Demand (BOD): 12 to 32 %, 5 days. (3)
Biochemical Oxygen Demand (BOD): 15 to 64 %, 10 days. (3)
Biochemical Oxygen Demand (BOD): 17 to 86 %, 20 days. (3)

13. DISPOSAL CONSIDERATIONS

Deactivating Chemicals: None required.

Waste Disposal Methods: This information applies to the material as manufactured. Reevaluation of the product may be required by the user at the time of disposal since the product uses, transformations, mixtures and processes may influence waste classification. Dispose of waste material at an approved (hazardous) waste treatment/disposal facility in accordance with applicable local, provincial and federal regulations. Do not dispose of waste with normal garbage, or to sewer systems.

Safe Handling of Residues: See "Waste Disposal Methods".

Disposal of Packaging: Empty containers retain product residue and may be hazardous. Empty drums should be completely drained, properly bunged and promptly returned to a drum reconditioner. Dispose of waste material at an approved waste incineration facility in accordance with applicable local, provincial and federal regulations.

14. TRANSPORTATION INFORMATION

CANADIAN TDG ACT / U.S. DOT CLASSIFICATION: Not regulated.

15. REGULATORY INFORMATION

CANADA
CEPA - NSNR: All constituents of this product are included on the DSL.
CEPA - NPRI: Not included.
Controlled Products Regulations Classification (WHMIS): Not regulated.

USA
Environmental Protection Act: All constituents of this product are included on the TSCA inventory.
OSHA Hazard Communication (29CFR 1910.1200) Classification: Not regulated.

HMIS: 1 Health, 1 Fire, 0 Reactivity. (3)

INTERNATIONAL: Triethylene Glycol is found on the following inventories: EINECS (European Inventory of Existing Commercial Chemical Substances), ACOIN (Australia), MITI (Japan) and Korea.

16. OTHER INFORMATION

ADDITIONAL INFORMATION AND SOURCES USED

1. RTECS-Registry of Toxic Effects of Chemical Substances, Canadian Centre for Occupational Health and Safety RTECS database.
2. Clayton, G.D. and Clayton, F.E., Eds., Patty's Industrial Hygiene and Toxicology, 3rd ed., Vol. IIA,B,C, John Wiley and Sons, New York, 1981.
3. Supplier's Material Safety Data Sheet(s).
4. "CHEMINFO", through "CCINFOdisc", Canadian Centre for Occupational Health and Safety, Hamilton, Ontario, Canada.
5. Guide to Occupational Exposure Values, 2005, American Conference of Governmental Industrial Hygienists, Cincinnati, 2005.

To obtain revised copies of this or other Material Safety Data Sheets, contact your nearest Brenntag Canada Regional office.

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