Material Safety Data Sheet

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Version 1.6
According to 91/155/EEC

1 - Product and Company Information

Product Name	ETHYLENE GYLCOL, STANDARD FOR GC
Product Number	85978
Company	Sigma-Aldrich Pte Ltd #08-01 Citilink Warehouse Singapore 118529 Singapore
Technical Phone #	65 271 1089
Fax	65 271 1571

2 - Composition/Information on Ingredients

Product Name	CAS #	EC no	Annex I Index Number
ETHYLENE GLYCOL	107-21-1	203-473-3	603-027-00-1

Formula	C2H6O2
Molecular Weight	62.07 AMU
Synonyms	Athylenglykol (German) * 1,2-Dihydroxyethane * 1,2-Ethandiol * 1,2-Ethanediol * Ethane-1,2-diol * Ethylene alcohol * Ethylene dihydrate * Ethylene glycol (ACGIH) * Glycol alcohol * Lutrol-9 * Macrogol 400 BPC * M.E.G. * Monoethylene glycol * NCI-C00920 * Norkool * Tescol * Dowtherm SR 1 * Ucar 17

3 - Hazards Identification

SPECIAL INDICATION OF HAZARDS TO HUMANS AND THE ENVIRONMENT
Harmful if swallowed.

4 - First Aid Measures

AFTER INHALATION
If inhaled, remove to fresh air. If not breathing give artificial respiration. If breathing is difficult, give oxygen.

AFTER SKIN CONTACT
In case of contact, immediately wash skin with soap and copious amounts of water.

AFTER EYE CONTACT
In case of contact, immediately flush eyes with copious amounts of water for at least 15 minutes.

AFTER INGESTION
If swallowed, wash out mouth with water provided person is conscious. Call a physician.

5 - Fire Fighting Measures

EXTINGUISHING MEDIA
Suitable: Carbon dioxide, dry chemical powder, or appropriate foam.

SPECIAL RISKS
Specific Hazard(s): Emits toxic fumes under fire conditions.

SPECIAL PROTECTIVE EQUIPMENT FOR FIREFIGHTERS
Wear self-contained breathing apparatus and protective clothing to prevent contact with skin and eyes.

SPECIFIC METHOD(S) OF FIRE FIGHTING
Do not direct a solid stream of water at burning material as spattering may result.

6 - Accidental Release Measures

PROCEDURE(S) OF PERSONAL PRECAUTION(S)
Wear respirator, chemical safety goggles, rubber boots, and heavy rubber gloves.

METHODS FOR CLEANING UP
Absorb on sand or vermiculite and place in closed containers for disposal. When spilled, the floor may be slippery. Wipe up the floor completely.

7 - Handling and Storage

HANDLING
Directions for Safe Handling: Do not breathe vapor. Avoid contact with eyes, skin, and clothing. Avoid prolonged or repeated exposure.

STORAGE
Conditions of Storage: Keep tightly closed.

SPECIAL REQUIREMENTS: Hygroscopic.

8 - Exposure Controls / Personal Protection

ENGINEERING CONTROLS
Mechanical exhaust required. Safety shower and eye bath.

GENERAL HYGIENE MEASURES
Wash thoroughly after handling.

EXPOSURE LIMITS

Country	Source	Type	Value
USA Poland	OSHA.	PEL NDS	50 ppm
			15 MG/M3
USA Poland	ACGIH	TLV NDSCh	100 mg/m3
			50 MG/M3
Poland		NDSP	-

EXPOSURE LIMITS - EUROPEAN UNION

Source	Type	Value
OEL	OEL	52 mg/m3
		20 ppm

Remarks: Skin

EXPOSURE LIMITS - DENMARK

Source	Type	Value
OEL	TWA	10 mg/m3

EXPOSURE LIMITS - GERMANY

Source	Type	Value
TRGS 900	OEL	26 mg/m3
		10 ppm

Remarks: =1=
Remarks: H,Y

EXPOSURE LIMITS - NORWAY

Source	Type	Value
	OEL	25 ppm

Remarks: HT

EXPOSURE LIMITS - SWEDEN

Source	Type	Value
	LLV (Level	25 mg/m3
		10 ppm

Remarks: H

EXPOSURE LIMITS - SWITZERLAND

Source	Type	Value
OEL	OEL	26 mg/m3
		10 ppm

Remarks: H C

EXPOSURE LIMITS - UNITED KINGDOM

Source	Type	Value
OEL	TWA	10 mg/m3

Remarks: particulates

Source	Type	Value
OEL	STEL	125 mg/m3

Remarks: vapor

PERSONAL PROTECTIVE EQUIPMENT
Respiratory Protection: Government approved respirator.
Hand Protection: Compatible chemical-resistant gloves.
Eye Protection: Chemical safety goggles.

9 - Physical and Chemical Properties

Appearance: Physical State: Liquid

Property	Value	At Temperature or Pressure
pH	N/A	
BP/BP Range	195 - 197 °C	
MP/MP Range	-13 °C	
Flash Point	111 °C	Method: closed cup
Flammability	N/A	
Autoignition Temp	400 °C	
Oxidizing Properties	N/A	
Explosive Properties	N/A	
Explosion Limits	Lower: 3.2 %	
	Upper: 15.3 %	
Vapor Pressure	0.08 mmHg	20 °C
SG/Density	1.113 g/cm3	
Partition Coefficient	Log Kow: -1.36	
Viscosity	N/A	
Vapor Density	2.1 g/l	
Saturated Vapor Conc.	N/A	
Evaporation Rate	1	

Bulk Density	N/A
Decomposition Temp.	N/A
Solvent Content	N/A
Water Content	< 0.1 %
Surface Tension	N/A
Conductivity	N/A
Miscellaneous Data	N/A
Solubility	Solubility in Water:Miscible. Solvent: 50 mg/ml EtOH Other Solvents: 50 MG/ML ETHER

10 - Stability and Reactivity

STABILITY
Stable: Stable.
Conditions to Avoid: Heat. Moisture.
Materials to Avoid: Strong acids, Strong oxidizing agents, Strong bases, Aldehydes, Aluminum.

HAZARDOUS DECOMPOSITION PRODUCTS
Hazardous Decomposition Products: Carbon monoxide, Carbon dioxide.

HAZARDOUS POLYMERIZATION
Hazardous Polymerization: Will not occur

11 - Toxicological Information

RTECS NUMBER: KW2975000

ACUTE TOXICITY
Oral
Human
LETHAL DOSE: 100 ML OR 3 OZ
LD50
Oral
Rat
*

LDLO
Oral
Human
786 mg/kg
Remarks: Behavioral:Convulsions or effect on seizure threshold. Behavioral:Coma. Gastrointestinal:Hypermotility, diarrhea.

LDLO
Oral
Human
398 mg/kg
Remarks: Behavioral:Headache. Gastrointestinal:Nausea or vomiting. Liver:Other changes.

LD50
Oral
Rat
4700 mg/kg

LD50
Intraperitoneal
Rat
5010 MG/KG

LD50
Subcutaneous
Rat
2800 MG/KG

LD50
Intravenous
Rat
3260 MG/KG

LD50
Oral
Mouse
5500 mg/kg

LD50
Intraperitoneal
Mouse
5614 MG/KG
Remarks: Lungs, Thorax, or Respiration:Chronic pulmonary edema. Kidney, Ureter, Bladder:Changes in both tubules and glomeruli. Blood:Changes in spleen.

LD50
Intravenous
Mouse
3 GM/KG

LD50
Oral
Dog
5500 mg/kg
Remarks: Kidney, Ureter, Bladder:Other changes.

LD50
Oral
Cat
1650 mg/kg
Remarks: Kidney, Ureter, Bladder:Other changes.

LD50
Skin
Rabbit
9530 UL/KG

LD50
Oral
Guinea pig
6610 mg/kg
Remarks: Behavioral:Somnolence (general depressed activity). Gastrointestinal:Other changes. Kidney, Ureter, Bladder:Other changes.

IRRITATION DATA

Eyes
Rat
12 mg/m3
3D

Skin
Rabbit

555 mg
Remarks: Open irritation test

Eyes
Rabbit
500 mg
24H
Remarks: Mild irritation effect

Eyes
Rabbit
100 mg
1H
Remarks: Mild irritation effect

Eyes
Rabbit
12 mg/m3
3D

Eyes
Rabbit
1,440 mg
6H
Remarks: Moderate irritation effect

SIGNS AND SYMPTOMS OF EXPOSURE

When ingested early symptoms mimic alcohol inebriation and are followed by nausea, vomiting, abdominal pain, weakness, muscle tenderness, respiratory failure, convulsions, cardiovascular collapse, pulmonary edema, hypocalcemic tetany, and severe metabolic acidosis. Without treatment, death may occur in 8 to 24 hours. Victims who survive the initial toxicity period usually develop renal failure along with brain and liver damage. Exposure to and/or consumption of alcohol may increase toxic effects.

ROUTE OF EXPOSURE

Skin Contact: May cause skin irritation.
Skin Absorption: May be harmful if absorbed through the skin.
Eye Contact: Causes eye irritation.
Inhalation: May be harmful if inhaled. Material may be irritating to mucous membranes and upper respiratory tract.
Ingestion: Harmful if swallowed.

TARGET ORGAN INFORMATION

Central nervous system. Kidneys. Eyes. Cardiovascular system. Liver.

CONDITIONS AGGRAVATED BY EXPOSURE

Ethylene glycol is metabolized to glycoaldehyde, glycolic acid, and glyoxal, followed by conversion to glyoxylic acid, formic acid, and oxalic acid. It has been shown that ethylene glycol is much less toxic than its metabolites. Glycolic acid is thought to be the major toxic metabolite causing acute as well as reproductive and developmental toxicity observed with ethylene glycol exposures. May cause nervous system disturbances.

CHRONIC EXPOSURE - CARCINOGEN

Result: This product is or contains a component that is probably not carcinogenic based on its IARC, ACGIH, NTP, or EPA classification.

CHRONIC EXPOSURE - MUTAGEN

Human
320 MMOL/L
Cell Type: lymphocyte
DNA inhibition

Rat
1200 MG/KG
Oral
Cytogenetic analysis

Mouse
100 MMOL/L
Cell Type: lymphocyte
Mutation in mammalian somatic cells.

CHRONIC EXPOSURE - TERATOGEN
Result: Laboratory experiments have shown teratogenic effects.

Species: Rat
Dose: 50 GM/KG
Route of Application: Oral
Exposure Time: (6-15D PREG)
Result: Specific Developmental Abnormalities: Skin and skin appendages. Specific Developmental Abnormalities: Musculoskeletal system. Specific Developmental Abnormalities: Blood and lymphatic system (including spleen and marrow).

Species: Rat
Dose: 8580 MG/KG
Route of Application: Oral
Exposure Time: (6-15D PREG)
Result: Effects on Embryo or Fetus: Fetotoxicity (except death, e.g., stunted fetus). Specific Developmental Abnormalities: Musculoskeletal system.

Species: Rat
Dose: 12500 MG/KG
Route of Application: Oral
Exposure Time: (6-15D PREG)
Result: Specific Developmental Abnormalities: Craniofacial (including nose and tongue). Specific Developmental Abnormalities: Musculoskeletal system.

Species: Mouse
Dose: 7500 MG/KG
Route of Application: Oral
Exposure Time: (6-15D PREG)
Result: Effects on Embryo or Fetus: Fetotoxicity (except death, e.g., stunted fetus). Specific Developmental Abnormalities: Musculoskeletal system.

Species: Mouse
Dose: 7500 MG/KG
Route of Application: Oral
Exposure Time: (6-15D PREG)
Result: Specific Developmental Abnormalities: Craniofacial (including nose and tongue). Specific Developmental Abnormalities: Musculoskeletal system.

CHRONIC EXPOSURE - REPRODUCTIVE HAZARD
Result: Overexposure may cause reproductive disorder(s) based on tests with laboratory animals.

Species: Rat
Dose: 25 GM/KG
Route of Application: Oral
Exposure Time: (6-15D PREG)
Result: Maternal Effects: Uterus, cervix, vagina. Effects on Fertility: Litter size (e.g.; # fetuses per litter; measured before birth). Effects on Embryo or Fetus: Fetotoxicity (except death, e.g., stunted fetus).

Species: Rat
Dose: 50 GM/KG
Route of Application: Oral
Exposure Time: (6-15D PREG)
Result: Effects on Fertility: Post-implantation mortality (e.g., dead and/or resorbed implants per total number of implants).

Species: Rat
Dose: 2500 MG/M3/6H
Route of Application: Inhalation
Exposure Time: (6-15D PREG)
Result: Maternal Effects: Other effects. Specific Developmental Abnormalities: Musculoskeletal system. Specific Developmental Abnormalities: Other developmental abnormalities.

Species: Mouse
Dose: 84 GM/KG
Route of Application: Oral
Exposure Time: (1-21D PREG/21D POST)
Result: Effects on Newborn: Live birth index (# fetuses per litter; measured after birth). Effects on Newborn: Growth statistics (e.g., reduced weight gain). Effects on Newborn: Delayed effects.

Species: Mouse
Dose: 88720 MG/KG
Route of Application: Oral
Exposure Time: (7-14D PREG)
Result: Effects on Fertility: Post-implantation mortality (e.g., dead and/or resorbed implants per total number of implants). Effects on Newborn: Stillbirth. Effects on Newborn: Live birth index (# fetuses per litter; measured after birth).

Species: Mouse
Dose: 15 GM/KG
Route of Application: Oral
Exposure Time: (6-15D PREG)
Result: Maternal Effects: Uterus, cervix, vagina. Effects on Fertility: Pre-implantation mortality (e.g., reduction in number of implants per female; total number of implants per corpora lutea). Effects on Fertility: Other measures of fertility

Species: Mouse
Dose: 1000 MG/M3/6H
Route of Application: Inhalation
Exposure Time: (6-15D PREG)
Result: Maternal Effects: Uterus, cervix, vagina. Maternal Effects: Other effects. Effects on Fertility: Pre-implantation mortality (e.g., reduction in number of implants per female;

total number of implants per corpora lutea).

Species: Mouse
Dose: 1000 MG/M3/6H
Route of Application: Inhalation
Exposure Time: (6-15D PREG)
Result: Effects on Fertility: Post-implantation mortality (e.g., dead and/or resorbed implants per total number of implants). Effects on Embryo or Fetus: Fetotoxicity (except death, e.g., stunted fetus). Effects on Newborn: Sex ratio.

Species: Mouse
Dose: 2100 MG/M3/6H
Route of Application: Inhalation
Exposure Time: (6-15D PREG)
Result: Maternal Effects: Other effects. Effects on Fertility: Pre-implantation mortality (e.g., reduction in number of implants per female; total number of implants per corpora lutea). Effects on Fertility: Post-implantation mortality (e.g., dead and/or resorbed implants per total number of implants).

Species: Mouse
Dose: 2100 MG/M3/6H
Route of Application: Inhalation
Exposure Time: (6-15D PREG)
Result: Effects on Fertility: Litter size (e.g.; # fetuses per litter; measured before birth). Effects on Embryo or Fetus: Fetotoxicity (except death, e.g., stunted fetus). Specific Developmental Abnormalities: Musculoskeletal system.

Species: Rabbit
Dose: 28 GM/KG
Route of Application: Oral
Exposure Time: (6-19D PREG)
Result: Maternal Effects: Other effects.

12 - Ecological Information

BIOACCUMULATION POTENTIAL: No indication of bioaccumulation.

ECOTOXICOLOGICAL EFFECTS

Test Type: LC50 Fish
Species: Onchorhynchus mykiss (Rainbow trout)
Time: 96 h
Value: 18,500 mg/l

Test Type: LC50 Fish
Species: Leuciscus idus
Time: 48 h
Value: > 10,000 mg/l

Test Type: EC50 Daphnia
Species: Daphnia magna
Time: 24 h
Value: 74,000 mg/l

ADDITIONAL ECOLOGICAL INFORMATION

BOD5: 0.78 %
COD: 1.29 %

13 - Disposal Considerations

SUBSTANCE DISPOSAL
Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber. Observe all federal, state, and local environmental regulations.

14 - Transport Information

RID/ADR
Non-hazardous for road transport.

IMDG
Non-hazardous for sea transport.

IATA
Non-hazardous for air transport.

15 - Regulatory Information

CLASSIFICATION AND LABELING ACCORDING TO EU DIRECTIVES
ANNEX I INDEX NUMBER: 603-027-00-1
INDICATION OF DANGER: Xn
Harmful.
R-PHRASES: 22
Harmful if swallowed.

COUNTRY SPECIFIC INFORMATION

Germany
WGK: 1

SWITZERLAND
SWISS POISON CLASS: 4

16 - Other Information

WARRANTY
The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Inc., shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale.

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