

Product Name: ETHYLENE OXIDE
MSDS Number: C00060
Version Date: 3/1/1999

Material Safety Data Sheet

-----1. CHEMICAL PRODUCT and COMPANY IDENTIFICATION-----

PRODUCT NAME: ETHYLENE OXIDE

SYNONYMS: ALPHA, BETA-OXIDOETHANE
DIHYDROOXIRENE
DIMETHYLENE OXIDE
OXACYCLOPROPANE
OXANE
OXIDOETHANE
OXIRAN
OXIRANE
1,2-EPOXYETHANE

TRANSPORTATION EMERGENCY PHONE
NUMBER (24 HOURS/DAY):
In USA, call800 424 9300.

-----2. COMPOSITION / INFORMATION on INGREDIENTS -----

COMPONENT	CAS NUMBER	
ETHYLENE OXIDE *	75-21-8	99.95%

*OSHA hazardous according to 29 CFR 1910.1200

-----3. HAZARDS IDENTIFICATION-----

EMERGENCY OVERVIEW

Ethylene oxide is a colorless gas with a sweet ether-like odor. Odor threshold: 500 ppm.

DANGER!

Extremely flammable liquid vapor (flashpoint: Tag Closed Cup, -4 °F; Tag Open Cup, <0 °F); vapor may cause flash fire.

Ethylene oxide vapor will decompose explosively when exposed to temperatures of 1040 °F and higher. May polymerize explosively if contaminated. Vapor is heavier than air and can travel considerable distance to a source of ignition and flash back.

POTENTIAL HEALTH EFFECTS

ROUTES OF EXPOSURE:

Skin, eyes, inhalation, ingestion.



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-----3. HAZARDS IDENTIFICATION(Continued)-----

IMMEDIATE EFFECTS:

SKIN:

Can lead to severe reddening and swelling of the skin, with blisters. Sensitization (allergic reaction) possible. Large amounts evaporating from skin can cause frostbite.

Ethylene oxide is readily absorbed into leather. Ethylene oxide absorbed into leather can cause very serious chemical burns in a short time period. If shoes, gloves, belts, leather watchbands or other articles are exposed to ethylene oxide, remove and discard them immediately.

EYES:

Contact with liquid can cause severe injury to the cornea. High exposure to vapors is irritating.

INHALATION:

Can cause irritation of nasal passages, throat and lungs, lung injury, nausea, vomiting, headache, diarrhea, shortness of breath, cyanosis (blue or purple coloring of the skin), and pulmonary edema (accumulation of fluid in the lungs): signs and symptoms of pulmonary edema can be delayed for several hours.

INGESTION:

Can cause stomach irritation and also liver and kidney damage.

DELAYED / LONG TERM EFFECTS

Based on laboratory animal data, ethylene oxide may affect peripheral nerve function, reproductive capabilities and the development of the fetus.

CARCINOGENIC EFFECTS:

IARC CARCINOGEN: ETHYLENE OXIDE 99.95% (75-21-8)

NTP CARCINOGENS: ETHYLENE OXIDE 99.95% (75-21-8)

OSHA CARCINOGEN: ETHYLENE OXIDE 99.95% (75-21-8)

See Section 11 for more information.

MUTAGENIC:

Ethylene oxide is mutagenic and clastogenic in a variety of test systems.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE:

Significant exposure to this chemical may adversely affect people with chronic disease of the respiratory system, skin, blood, liver, central nervous system, kidneys and/or eyes.

FOR FURTHER INFORMATION, SEE:

Section 4 - First Aid Measures

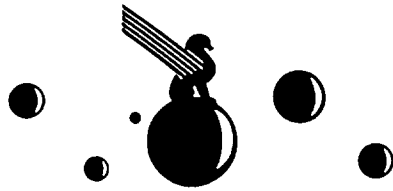
Section 5 - Fire Fighting Measures

Section 6 - Accidental Release Measures

Section 8 - Exposure Controls/Personal Protection

Section 9 - Physical and Chemical Properties

Section 10 - Stability and Reactivity



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-----4. FIRST AID MEASURES-----

SKIN:

Remove contaminated clothing immediately and wash contaminated skin with large amounts of soap and water. If irritation persists, contact a physician. See Section 7, Handling and Storage, for instructions regarding leather clothing and articles.

EYES:

Flush eyes with water for at least 15 minutes. Contact a physician immediately.

INHALATION:

Remove patient from contaminated area. If breathing has stopped, give artificial respiration, then oxygen if needed. Contact a physician immediately.

INGESTION:

Patient should be made to drink large quantities of water. Then, induce vomiting by pressing finger down throat. Contact a physician immediately. Never give anything by mouth to an unconscious person.

-----5. FIRE FIGHTING MEASURES-----

NFPA (H, F, R): 3, 4, 3

FLAMMABLE PROPERTIES

UPPER EXPLOSIVE LMT : 100 % in air by volume.
LOWER EXPLOSIVE LMT : 3.0 % in air by volume.
FLASHPOINT OPEN CUP : < -17.8 °C (< 0 °F)
FLASHPOINT (CC) : -20.0 °C (-4.0° F)

HAZARDOUS PRODUCTS OF COMBUSTION:

Carbon monoxide.

EXTINGUISHING MEDIA:

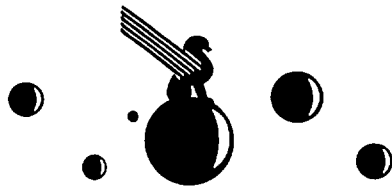
Use water (flood with water), carbon dioxide, dry chemical or alcohol-type aqueous film-forming foam.

When fighting an ethylene oxide fire, it is best to attempt to extinguish it rather than allow it to burn itself out due to the explosion potential. If the fuel supply cannot be shut off, continue to flood the area with large amounts of water.

FIRE FIGHTING INSTRUCTIONS:

If potential exists for exposure to vapors or products of combustion, wear complete personal protective equipment, including self-contained breathing apparatus with full face-piece operated in pressure-demand or other positive-pressure mode. Water spray can be used to reduce intensity of flames and to dilute spills to nonflammable mixture. Use water spray to cool fire-exposed structures and vessels, and piping. Ethylene oxide vapor is heavier than air and can travel considerable distance to a source of ignition and flashback.

ETHYLENE OXIDE VAPOR WILL DECOMPOSE EXPLOSIVELY WHEN THE TEMPERATURE REACHES 1040 °F. Because of the potential for decomposition, in an external fire case with ethylene oxide, it is usually prudent to extinguish the fire even before the flow of fuel is stopped.



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-----5. FIRE FIGHTING MEASURES---(continued)-----

Dilution of ethylene oxide with 23 volumes of water renders it non-flammable. A ratio of 100 parts water to one part ethylene oxide may be required to control build-up of flammable vapors in a closed system. Ethylene oxide is an NFPA Class 1A flammable liquid with a boiling point of 51°F. Locations classified as hazardous because of the presence of ethylene oxide are designated Class 1.

-----6. ACCIDENTAL RELEASE MEASURES-----

Ethylene oxide/air mixtures may detonate upon ignition. Evacuate all personnel from the area except for those engaged in stopping the leak or in clean-up.

Eliminate ignition sources. Avoid eye or skin contact; see "Section 8 - Exposure Controls/Personal Protection" for respirator information. Place leaking containers in well-ventilated area with spill containment. Use water spray to disperse vapors. An alcohol-based fire fighting foam can be used to suppress vaporization with large spills. Contain spill and use absorbent materials to facilitate clean-up. Do NOT use vacuum trucks due to the risk of explosion. Avoid runoff into storm sewers and ditches which lead to natural waterways.

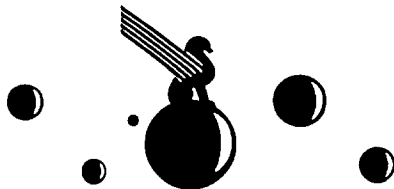
Call the National Response Center (800 424 8802) if the quantity (of any component) spilled is equal to or greater than the reportable quantity (RQ) under CERCLA "Superfund": 10 lb/day.

For more information, see "Section 15 - Regulatory Information tin".

-----7. HANDLING AND STORAGE-----

Storage vessels should be insulated and should have pressure relief valves. To avoid product contamination, install double-block valves on outlet of storage vessels. Electrical installations should be in accordance with Article 501 of the National Electrical Code for Class I locations. Exhaust systems, transfer pumps and other handling equipment must be equipped with explosion-proof motors. Do not incinerate ethylene oxide cartridges, tanks or other containers.

Store in a cool, well-ventilated area. Keep away from heat, sparks and flame. Keep containers closed when not in use. Always open containers slowly to allow any excess pressure to vent. Use only DOT-approved containers. When transferring, follow proper grounding procedures. Use with adequate ventilation. Avoid breathing gas. Avoid contact with eyes, skin and clothing. Wash thoroughly with soap and water after handling. Decontaminate soiled clothing thoroughly. Discard contaminated leather clothing and articles (such as belts, watchbands, wallets, etc.). Replace or repair protective equipment that has been torn or otherwise damaged. Protective clothing wet with ethylene oxide should be immediately removed while under a safety shower. Do not expose to temperatures above 21 °C (70 °F). Use spark-resistant tools. Do not load into compartments adjacent to heated cargo. Do not store near combustible materials. Do not enter storage area unless it is adequately ventilated. Blanket storage vessels with nitrogen. Avoid product contamination.



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-----8. EXPOSURE CONTROLS / PERSONAL PROTECTION -----

ENGINEERING CONTROLS:

General or dilution ventilation is frequently insufficient as the sole means of controlling employee exposure. Local ventilation is usually preferred.

PROTECTIVE EQUIPMENT

A safety shower and eye bath should be readily available.

SKIN:

For operations where spills or splashing can occur, use chemical protective clothing, including butyl rubber gloves and boots and full face protection. Contaminated gloves must be discarded.

EYES:

Chemical safety goggles. Contact lenses should not be worn if exposure to ethylene oxide is likely to occur.

INHALATION:

Based on contamination level and working limits of the respirator, use a respirator approved by NIOSH/MSHA (the following are the minimum recommended equipment).

FOR ETHYLENE OXIDE CONCENTRATIONS OF:

≥1 and ≤ 50 ppm - Air-purifying respirator with full facepiece and ethylene oxide approved canister.

> 50 and < 800 ppm - Positive-pressure full facepiece supplied-air respirator, or continuous-flow full facepiece supplied-air respirator.

≥800 ppm or unknown concentration (such as in emergencies) - Positive-pressure self-contained breathing apparatus with full facepiece. Positive-pressure supplied-air respirator with full facepiece equipped with an auxiliary positive-pressure self-contained breathing apparatus escape system.

EXPOSURE GUIDELINES:

ETHYLENE OXIDE (75-21-8)

OSHA PEL

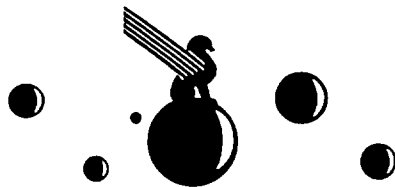
5 PPM (EXCUR)

1 PPM (TWA)

ACGIH TLV

1 PPM (TWA)

Immediately Dangerous to Life or Health (IDLH) level: 800 ppm.



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-----9. PHYSICAL AND CHEMICAL PROPERTIES-----

APPEARANCE : Colorless gas.
ODOR : Sweet ether-like odor. Odor Threshold: 500 ppm.
PHYSICAL STATE : Gas
VAPOR PRESSURE : 1094 mmHg at 20 °C
VAPOR DENSITY : 1.5 (Air = 1 at 20°C)
BOILING POINT : 10.7 °C (51.3 °F) at 760 mmHg
FREEZING POINT : -112.5 °C (-170.5 °F)
SOLUBILITY : Complete in water.
SPECIFIC GRAVITY : 0.871 at 20/20 °C
MOLECULAR WEIGHT : 44.1

-----10. STABILITY AND REACTIVITY-----

CHEMICAL STABILITY:

Ethylene oxide vapor will decompose explosively at 1040° F.

CONDITIONS TO AVOID:

Heat, sparks, flame.

INCOMPATIBILITY:

Alcohols; amines; mercaptans; metallic chlorides; aqueous alkalis; mineral acids; oxides; strong oxidizing agents (for example, oxygen, hydrogen peroxide or nitric acid).

HAZARDOUS DECOMPOSITION PRODUCTS:

Carbon monoxide.

HAZARDOUS POLYMERIZATION:

Can occur. UNCONTROLLED POLYMERIZATION CAN CAUSE RAPID EVOLUTION OF HEAT AND INCREASED PRESSURE WHICH CAN RESULT IN VIOLENT RUPTURE OF STORAGE VESSELS OR CONTAINERS.

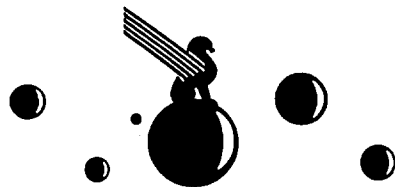
-----11. TOXICOLOGICAL INFORMATION-----

Oral LD50: 0.1 g/kg (rats); moderately toxic to animals.

Inhalation LC50 : 1460 ppm (rats, 4 hrs); slightly toxic.

Irritation: Vapor exposure may product eye irritation with redness and swelling of the conjunctiva. Eye contact with liquid can produce chemical burns to the cornea. Skin contact with liquid or aqueous solutions can produce severe irritation with blister formation, which may not appear for several hours after exposure.

Mutagenicity: Mutagenic and clastogenic in a variety of tests including cell culture and whole animal assays.



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-----11. TOXICOLOGICAL INFORMATION----(continued)-----

Carcinogenicity : Carcinogenic to animals by inhalation. Associated with cancer of the lymphatic and hemopoietic systems in humans. Listed as an cancer hazard by OSHA, a human carcinogen by IARC, and a suspected human carcinogen by NTP and the ACGIH TLV committee.

Reproduction : Ethylene oxide has produced testicular degeneration, decreased fertility, and fetotoxicity in laboratory animals.

Nervous System: Inhalation exposure to ethylene oxide has produced peripheral neuropathy in humans and laboratory animals.

-----12. ECOLOGICAL INFORMATION-----

ECOTOXICITY

Aquatic Toxicity :

Fathead minnow: LC50=57 mg/l (96hr)
Goldfish : LC50=90 mg/l (24hr)
Water flea : LC50=137 mg/l (48hr)
Brine shrimp : LC50=490 mg/l (48hr)

Studies have shown ethylene oxide to be rapidly degradable through chemical hydrolysis to ethylene glycol. Ethylene glycol is rapidly biodegraded in aquatic environments.

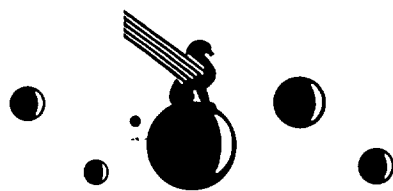
-----13. DISPOSAL CONSIDERATIONS-----

All notification, clean-up and disposal should be carried out in accordance with federal, state and local regulations. Preferred methods of waste disposal are incineration or biological treatment in federal/state approved facility. Ethylene oxide concentrations greater than 1000 ppm will kill the microorganisms in the biological treatment plant.

Hazardous waste (40 CFR 261): Yes; U115, D001.

-----14. TRANSPORT INFORMATION-----

DOT proper shipping name : Ethylene Oxide
DOT hazard class : 2.3, Poisonous Gas
Subsidiary hazard : 2.1, Flammable Gas
UN/NA identification number : UN 1040
ER guidebook number : 119
Reportable quantity (RQ) : 10 lb/4.54 kg
Shipping Description : Poison Inhalation Hazard, Zone D



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-----15. REGULATORY INFORMATION-----

RECIPIENT MUST COMMUNICATE ALL PERTINENT INFORMATION HEREIN TO EMPLOYEES AND CUSTOMERS.

STATE REGULATIONS

The following chemicals associated with the product are subject to the right-to-know regulations in these states:

ETHYLENE OXIDE (75-21-8): CT, FL, IL, LA, MA, MI, NJ, NY, PA, RI

CALIFORNIA PROPOSITION 65:

"This substance is known by the state of California to cause cancer and birth defects."

U.S. FEDERAL REGULATIONS

TSCA Inventory Status: Listed

SARA 313: ETHYLENE OXIDE 99.95% (75-21-8)

ENVIRONMENTAL

CERCLA: ETHYLENE OXIDE 99.95% (75-21-8)

SARA 302: ETHYLENE OXIDE 99.95% (75-21-8)

SARA 304: ETHYLENE OXIDE 99.95% (75-21-8)

SARA 311:

Acute health----- Yes

Chronic health----- Yes

Fire----- Yes

Sudden release of pressure---- Yes

Reactive----- Yes

INTERNATIONAL REGULATIONS

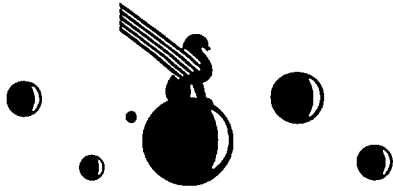
Listed on the chemical inventories of the following countries: Australia, Canada, Europe (EINECS), Japan and Korea.

-----16. OTHER INFORMATION-----

HAZARD RATINGS

	HEALTH	FLAMM	REACT	OTHER
NFPA	3	4	3	
HMIS	3	4	3	X

This information is intended solely for the use of individuals trained in the NFPA and HMIS systems.



OLD WORLD INDUSTRIES I, LTD.

4065 Commercial Avenue
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-----16. OTHER INFORMATION----(continued)-----

DISCLAIMER:

The information contained herein is accurate to the best of our knowledge. We do not suggest or guarantee that any hazards listed herein are the only ones which exist.

This material may be released from gas, liquid, or solid materials made directly or indirectly from it. User has the sole responsibility to determine the suitability of the materials for any use and the manner of use contemplated.

User must meet all applicable safety and health standards.