

**ACCEPTED**  
JUN 08 1983  
Under the Federal Insecticide,  
Fungicide, and Rodenticide Act,  
registered under the pesticide  
EPA Reg. No. 10330-13

**ETHYLENE OXIDE**

STERILANT - FUMIGANT GAS

UN1040

ACTIVE INGREDIENT, 100% BY WEIGHT

NET CONTENTS 4 LBS. (1.8kg)



**WILSON** SPECIALTY GASES  
674-8100 (7/82)

CGA-310

BEFORE USING PRODUCT READ WARNING LABEL ON SIDE OF CYLINDER

Fit

# ETHYLENE OXIDE

STERILANT-FUMIGANT GAS  
ACTIVE INGREDIENT 100% BY WEIGHT

**DANGER! EXTREMELY FLAMMABLE LIQUID AND GAS UNDER PRESSURE. MAY FORM EXPLOSIVE MIXTURES WITH AIR. HARMFUL IF INHALED. CAUSES EYE AND SKIN BURNS. SUSPECT CANCER HAZARD.**

**ODOR: ETHER-LIKE**

**TLV: 10 PPM (1982 ACGIH)**

Keep away from heat, flame and sparks. Do not breathe vapor. Do not get in eyes, on skin or clothing. Use only in a closed system. Store and use with adequate ventilation. No part of the container may be exposed above 125°F (52°C). Close valve when not in use and when empty. Use in accord with tag attached to valve, Linde Form L-4798 (MSDS) and safe practices booklets 3499 and L-12-237.

**FIRST AID:** IF INHALED, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician. IN CASE OF CONTACT, immediately flush eyes or skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Call a physician. Discard contaminated clothing and shoes.

**LEAK:** Evacuate area and keep personnel upwind. Shut off all sources of ignition. Use self-contained breathing apparatus and protective clothing and shut off leak if without risk.

**FIRE:** Do not extinguish burning gas if flow cannot be shut off immediately. Move container away from fire if without risk. Use water spray or fog nozzle to keep container cool.

**IN EMERGENCY:** Call CHEMTREC 800-424-9300.

**FOR INDUSTRIAL USE ONLY.**

Union Carbide Corporation—Linde Division, Danbury, CT 06817

DOT/IMO Shipping Name: Ethylene Oxide UN1040

EPA Reg. No. 10330-13

EPA Est. No. 10330-

STB-0100 (3/83)

10330-13

**LINDE SPECIALTY GASES**

MADE IN USA

DO NOT REMOVE THIS LABEL

DO NOT DETACH THIS TAG

**ETHYLENE OXIDE**  
STERILANT-FUMIGANT GAS

ACTIVE INGREDIENT-ETHYLENE OXIDE 100% BY WEIGHT  
DANGER-EXTREMELY FLAMMABLE

**DIRECTIONS FOR USE**

To be used only by persons experienced in Ethylene Oxide sterilization and fumigation, or by persons under direct supervision of persons who are experienced in Ethylene Oxide sterilization and fumigation. Use only in accordance with directions given on this tag and the safety precautions listed on the body label. See current Union Carbide Corporation, Linde Division, Material Safety Data Sheet Form 4796 and safe practices booklet 3499 for additional safety information.

**GENERAL INSTRUCTIONS**

- 1 This container is equipped with an eductor tube and is designed to discharge liquid.
- 2 This container has been pressurized with nitrogen to a pressure of 50 psig (345 kPa) at 70°F (21.1°C). Pressure will be higher if temperature is above 70°F (21.1°C), lower if temperature is below 70°F (21.1°C). Contact supplier if, upon receipt, container pressure is below 50 psig (345 kPa) at 70°F (21.1°C).
- 3 Container must be in upright position when discharging. Container must be secured to prevent falling over.
- 4 Discharge valve outlet is provided with a CGA 510 connection which has left-hand threads.
- 5 EDX-style cylinders and DOT-5P drums are also provided with a CGA 580 pressurization valve which has right-hand threads. Do not discharge product from the CGA 580 pressurization valve.
- 6 Remove protective valve plugs and make sure valve threads are undamaged. Do not attach ordinary pipe fitting to these valves.
- 7 Use steel fittings and piping or Teflon-lined stainless steel tubing. Do not use rubber, plastics or copper materials. Ground all equipment, including cylinders, to avoid static sparks.
- 8 Install check valves in the discharge line from this container to processing equipment to prevent back-flow into container.
- 9 Connect the CGA 580 pressurization valve to a source of nitrogen using a line equipped with a pressure regulator and check valve. Nitrogen pressure must not exceed 50 psig (345 kPa). Never use compressed air or other gases to pressurize the cylinder or drum.
- 10 Open both valves by turning handwheel counterclockwise. Use standard "T" wrenches (Linde P: NSG6214 and SG 6215) to open and close cylinder valves. Never use an ordinary wrench or other leverage device to open or close cylinder valves.
- 11 Replace valve plugs tightly in valve outlets before returning container to supplier.

**STERILIZATION**

- 1 Use Ethylene Oxide only in sterilizers designed for use with Ethylene Oxide.
- 2 Use Ethylene Oxide in accordance with directions supplied by the sterilizer manufacturer.
- 3 Sterilizer temperature and pressure influence both exposure time and Ethylene Oxide concentration. The variation of type and quantity of material to be sterilized, how packed, size of sterilizer, types of bacteria to be killed, and chamber relative humidity also affect the exposure time required for sterilization. Gas sterilizer cycle parameters should be those prescribed by the sterilizer manufacturer, if applicable. If other cycle parameters are used, the efficacy of the alternate cycle must be validated and is the responsibility of the user.
- 4 Aerate sterilized materials before use.

**FUMIGATION**

- 1 Fumigation with Ethylene Oxide must be performed only in vacuum or gas-tight chambers designed for use with Ethylene Oxide.
- 2 Aerate fumigated materials before use.

**FOOD TREATMENT 21 CFR 183.200**

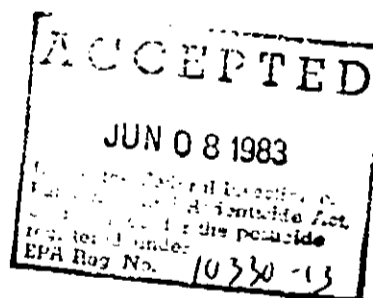
"Ethylene Oxide may be safely used as a fumigant for the control of microorganisms and insect infestation in ground spices or other processed natural seasoning materials, except mixtures to which salt has been added."

"Ethylene Oxide, either alone or admixed with carbon dioxide or dichlorodifluoromethane, shall be used in amounts not to exceed that required to accomplish the intended technical effects."

Union Carbide Corporation—Linde Division, Danbury, CT 06817

**LINDE SPECIALTY GASES**

STT-0100 (2/83)



# MATERIAL SAFETY DATA SHEET

L-4798-A

(Essentially similar to U.S. Department of Labor Form OSHA 201)  
 An explanation of the terms used here may be found in OSHA  
 publication 2265 available from OSHA regional or area offices.  
 Do Not Duplicate This Form. Request an Original.

## I. PRODUCT IDENTIFICATION

PRODUCT	Ethylene Oxide		
CHEMICAL NAME	Ethylene Oxide	SYNONYMS	Oxirane, 1,2-Epoxyethane
FORMULA	CH <sub>2</sub> CH <sub>2</sub> O	CHEMICAL FAMILY	Oxides
		MOLECULAR WEIGHT	44.05
TRADE NAME	Ethylene Oxide (EO/EO)		

## II. HAZARDOUS INGREDIENTS

For mixtures of this product request the respective component Material Safety Data Sheets.  
 MSDS's for the following EO mixtures are available: a) Carboxide, L 4705, b) Oxyfume 12, L 4799,  
 c) Oxyfume 20, L 4703, d) Oxyfume 30, L 4704, e) Oxyfume 80, L 4800. See Section IX.

MATERIAL	Wt (%)	1982 ACGIH TLV-TWA (Units)
Ethylene Oxide	100	10 ppm (20 mg m <sup>-3</sup> ) 1 ppm, A2 (1982 - Notice of intended changes)

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*NOTE*  
 Currently, Union Carbide Corp. has established for its own use a TLV-TWA of 5 ppm.

## III. PHYSICAL DATA

BOILING POINT, 760 mm. Hg	10.4°C (50.7°F)	FREEZING POINT	112.5°C (-170.5°F)
SPECIFIC GRAVITY (H <sub>2</sub> O = 1)	0.871 at 29°C	VAPOR PRESSURE AT 20°C	1,095 mm Hg
VAPOR DENSITY (air = 1)	1.49	SOLUBILITY IN WATER, by wt	Complete See Section IX
PERCENT VOLATILES BY VOLUME	100	EVAPORATION RATE (Butyl Acetate = 1)	72
APPEARANCE AND ODOR	Colorless liquid, colorless gas, nonresidual ether-like odor in high concentration		

## EMERGENCY PHONE NUMBER

IN CASE OF EMERGENCIES involving this material, further information is available at all times at 304-744-3487.  
 For routine information contact your local supplier.

Union Carbide Corporation requests the users of this product to study this Material Safety Data Sheet (MSDS) and become aware of product hazards and safety information. To promote safe use of this product a user should (1) notify its employees, agents and contractors of the information on this MSDS and any product hazards and safety information, (2) furnish this same information to each of its customers for the product, and (3) request such customers to notify their employees and customers for the product of the same product hazards and safety information.

UNION CARBIDE CORPORATION LINDE DIVISION  
 Old Ridgebury Road, Danbury, CT 06817

L-4798-A

**IV. HEALTH HAZARD DATA**

THRESHOLD LIMIT VALUE See Section II

**EFFECTS OF OVEREXPOSURE AND EMERGENCY AND FIRST AID PROCEDURES****ACUTE EFFECTS OF OVEREXPOSURE**

**SWALLOWING:** A very unlikely route of exposure. Severe irritation and ulceration of the mouth and throat, abdominal pain, nausea, vomiting, collapse, and coma.

**INHALATION:** Irritation of the eye, nose, and throat. Headache, nausea, vomiting, diarrhea, coughing, chest tightness, cyanosis, weakness, drowsiness, loss of coordination, convulsions, and coma. Delayed onset pulmonary edema may occur.

**SKIN:** Absorption by sustained contact with the skin is unlikely, but could lead to headache, dizziness, nausea, and vomiting.

Contact with liquid can lead to delayed onset of erythema, edema, vesiculation, and blister formation. Usually several hours to onset.

**EYES:** Burns from liquid, moderate eye irritation from vapor.

**CHRONIC EFFECTS OF OVEREXPOSURE**

Ethylene Oxide is mutagenic. Animals exposed to Ethylene Oxide vapor for up to 2 years have shown an increase in the incidence of malignant tumors compared with controls. Ethylene Oxide should be regarded as a suspect cancer agent.

**OTHER HEALTH HAZARDS**

Allergic contact dermatitis may occur. A few cases of neuropathy (mainly peripheral) have been described from recurrent exposure to high vapor concentrations.

**EMERGENCY AND FIRST AID PROCEDURES**

**SWALLOWING:** Drink a glass of water and induce vomiting. Call a physician.

**INHALATION:** Remove to fresh air, and administer oxygen if breathing is difficult. Observe for vomiting. If breathing stops, start artificial respiration, preferably with the simultaneous administration of oxygen. Call a physician.

**SKIN:** Immediately remove contaminated clothing and wash skin copiously with soap and water. Contact a physician if irritation persists or blisters form.

**EYES:** Flush immediately with water and continue for at least 15 minutes. Contact an ophthalmologist immediately.

**NOTE:** Aerate contaminated clothing, then wash clothing before re use. Destroy contaminated leather articles such as shoes and gloves.

**NOTES TO PHYSICIAN**

1. Persons exposed to Ethylene Oxide may develop severe and intractable vomiting, requiring the use of antiemetics given intravenously.
2. Prolonged or high vapor concentration exposure may result in the development of pulmonary edema after a latent phase of several hours. Also, respiratory tract injury caused by Ethylene Oxide may predispose to the development of a secondary respiratory infection. Individuals exposed to moderately high vapor concentrations of Ethylene Oxide should be retained for observation.
3. Following skin contamination, primary irritation and blister formation may be delayed in onset.

PRODUCT: Ethylene Oxide

L-4798-A

V. FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (test method)	- 0°F TAG Closed Cup - 0°F TAG Open Cup	AUTOIGNITION TEMPERATURE	804°F
FLAMMABLE LIMITS IN AIR, % by volume	LOWER 3	UPPER	100

EXTINGUISHING MEDIA

Use water spray, carbon dioxide, dry chemical, alcohol type or universal type foams applied by manufacturer's recommended technique.

SPECIAL FIRE FIGHTING PROCEDURES

Evacuate all personnel from danger area. Immediately cool containers with water spray from maximum distance taking care not to extinguish flames. Remove ignition sources if without risk. If flames are accidentally extinguished, explosive re-ignition may occur. Use self contained breathing apparatus where necessary. Stop flow of gas if without risk, while continuing cooling water spray. Remove all containers from area of fire if without risk. Allow fire to burn out. Dilution of Ethylene Oxide with 100 volumes of water renders it nonflammable.

UNUSUAL FIRE AND EXPLOSION HAZARDS

Extremely flammable. May form explosive mixtures with air and oxidizing agents. Do not extinguish flames due to possibility of explosive re-ignition. Flammable vapors may spread from spill. Explosive atmospheres may linger. Before entering area, especially confined areas, check atmosphere with appropriate device. No part of a container should be subjected to a temperature higher than 52°C (approximately 125°F). Containers are provided with pressure relief devices that are designed to vent the contents when they are exposed to elevated temperatures. Vapors can burn without the presence of air or oxidizing agents. Ethylene Oxide can decompose violently under certain conditions. See Section VI.

VI. REACTIVITY DATA

STABILITY		CONDITIONS TO AVOID
UNSTABLE	STABLE	
	X	Stable at ordinary conditions of temperature and pressure and in ordinary use, handling and storage. Will decompose violently at temperature above 800°F.

INCOMPATIBILITY (materials to avoid)  
Copper, silver, magnesium, mercury, and their salts, and oxidizers of all types. Alkalies and acids.

HAZARDOUS DECOMPOSITION PRODUCTS

Thermal decomposition may produce carbon monoxide and/or carbon dioxide.

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HAZARDOUS POLYMERIZATION		CONDITIONS TO AVOID
May Occur	Will not Occur	
X		Trace polymers may be present under ordinary conditions of temperature, pressure, etc. However, ethylene oxide will polymerize violently if contaminated with aqueous alkalies, amines, mineral acids, metal chlorides or metal oxides.

VII. SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED

DANGER: May form explosive mixtures with air (see Section VI). Immediately evacuate all personnel from danger area. Use self contained breathing apparatus where needed. Remove all sources of ignition if without risk. Reduce vapors with fog or fine water spray. Shut off leak if without risk. Ventilate area of leak or move leak assembly to well ventilated area. Flood large spills with water. Prevent runoff to collection area. Flammable vapors may spread from spill. Before entering area, especially confined areas, check atmosphere with appropriate device.

WASTE DISPOSAL METHOD

Discard any product in a labeled, suitable container. Follow applicable federal, state, and local regulations. Ethylene Oxide is highly toxic to most forms of life. It is a known carcinogen. It is highly flammable and explosive. It is a strong irritant to the eyes, nose, throat, and lungs. It is also a strong irritant to the skin. It is a strong irritant to the mucous membranes of the mouth and throat. It is a strong irritant to the respiratory tract. It is a strong irritant to the eyes. It is a strong irritant to the skin. It is a strong irritant to the mucous membranes of the mouth and throat. It is a strong irritant to the respiratory tract. It is a strong irritant to the eyes. It is a strong irritant to the skin.

**VIII. SPECIAL PROTECTION INFORMATION**

**RESPIRATORY PROTECTION (specify type)**

Positive pressure, self-contained breathing apparatus when needed

<b>VENTILATION</b>	<b>LOCAL EXHAUST</b> Preferred
	<b>MECHANICAL (general)</b> Acceptable
	<b>SPECIAL</b> The product must be confined in tight vapor-tight equipment and stored under pressurized nitrogen or other suitable inert gas. Confined in this manner, vapors should not be released and general (mechanical) room ventilation is expected to be satisfactory.
	<b>OTHER</b>

**PROTECTIVE GLOVES** Rubber - See Section IX

**EYE PROTECTION** Full face shield and safety glasses or goggles.

**OTHER PROTECTIVE EQUIPMENT** Metatarsal shoes for cylinder handling, safety shoes, eye wash fountain. Rubber shoes and apron when risk of liquid spill exists.

**IX. SPECIAL PRECAUTIONS**

**DANGER:** Extremely flammable, liquefied gas under pressure. May form explosive mixtures with air. Do not breathe vapor. Can cause rapid suffocation due to oxygen deficiency. Avoid contact with eyes, skin or clothing. Safety showers and eyewash fountains should be immediately available. Use piping and equipment adequately designed to withstand pressures to be encountered. Ground all equipment. Only use spark proof tools and steel on proof equipment. Keep away from heat, sparks and open flame. Store and use with adequate ventilation at all times. Use only in a closed system. Close valve when not in use and when empty.

It may be feasible to convert aqueous solutions of ethylene oxide to ethylene glycol under the correct conditions of pH, temperature and pressure and dispose of glycol solution. Under certain conditions EO will evolve from water solutions. See Section VIII, Ventilation, Special.

**BIOLOGICAL TREATMENT.** Ethylene Oxide is amenable to disposal in standard bacteriological waste treatment facilities under controlled conditions after proper acclimation of system.

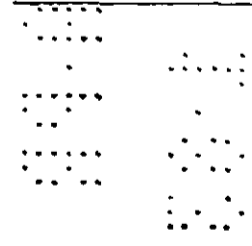
Contaminated rubber gloves and rubber clothing should be allowed to air out for several days before cleaning and reuse.

**MIXTURES:** When two or more gases or liquefied gases are mixed, their hazardous properties may combine to create additional, unexpected hazards. Obtain and evaluate the safety information for each component before you produce the mixture. Consult an Industrial Hygienist or other trained person when you make your safety evaluation of the end product. Remember, gases and liquids have properties which can cause serious injury or death.

**WARNING:** Be sure to read and understand all labels and other instructions supplied with all containers of this product.

**OTHER HANDLING AND STORAGE CONDITIONS** Never work on a pressurized system. If there is a leak, close the cylinder valve, blow down the system by venting to a safe place, then repair the leak.

The opinions expressed herein are those of qualified experts within Union Carbide Corporation. 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 these opinions and the conditions of use of the product are not within the control of Union Carbide Corporation, it is user's obligation to determine the conditions of safe use of the product.



**UNION CARBIDE CORPORATION**  
LINDE DIVISION  
GENERAL OFFICES DANBURY, CT  
OFFICES IN PRINCIPAL CITIES