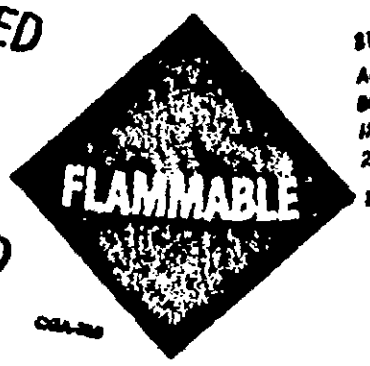
COMPRESSED GAS N.O.S.
UN1954

OXYFUME® 80



STERILANT - FUMIGANT GAS
ACTIVE INGREDIENT - ETHYLENE OXIDE
80% BY WEIGHT
INERT INGREDIENT - CARBON DIOXIDE
20% BY WEIGHT
NET CONTENTS - 160 LBS. (72.5Kg)

SPECIALTY GASES

BEFORE USING PRODUCT, READ WARNING LABEL ON SIDE OF CYLINDER

ACCEPTED

JUN 24 1983

Under the Federal Insecticide, Fungicide, and Rodenticide Act, as amended, for the pesticide registered under EPA Reg. No. 1C 332-3

283-166c

OXYFUME® 80

STERILANT GAS

ACTIVE INGREDIENT - ETHYLENE OXIDE 80% BY WEIGHT
INERT INGREDIENT - CARBON DIOXIDE 20% 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 (Ethylene Oxide): 10 PPM (1982 ACGIH)

Keep away from heat, flame and sparks. Do not breathe gas. 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 cylinder 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-4800 (MSDS) and safe practices booklet L-3499.

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. Use water spray or fog nozzle to keep cylinder cool. Move cylinder away from fire if without risk.
IN EMERGENCY: CALL CHEMTREC 800-424-9300.

FOR INDUSTRIAL USE ONLY.

Union Carbide Corporation—Linde Division, Danbury, CT 06817

DOT Shipping Name: Compressed Gas N.O.S. UN1954
IMO Shipping Name: Liquefied Gas N.O.S. UN1954
EPA Reg. No. 10330-3
EPA Est. No. 10330- **STB-0500 (3/83)**

LINDE SPECIALTY GASES

MADE IN USA DO NOT REMOVE THIS LABEL

ACCEPTED
JUN 24 1983
Under the Federal Insecticide, Fungicide, and Rodenticide Act, as amended, for the pesticide registered under EPA Reg. No. 10330-3

DO NOT DETACH THIS TAG

OXYFUME® 80
STERILANT GAS

ACTIVE INGREDIENT - ETHYLENE OXIDE 80% BY WEIGHT
INERT INGREDIENT - CARBON DIOXIDE 20% BY WEIGHT

DIRECTIONS FOR USE
DANGER — EXTREMELY FLAMMABLE
To be used only by persons experienced in Oxyfume® 80 gas sterilization, or by persons under direct supervision of persons who are experienced in Oxyfume® 80 gas sterilization. Use only in accordance with directions given on this tag and the precautions listed on the body label. See Union Carbide Corporation, Linde Division, Material Safety Data Sheet, Form L-4800 and safe practices booklet L-3499 for additional safety information.

GENERAL INFORMATION
1. This cylinder is equipped with an eductor tube and is designed to discharge liquid.
2. The approximate vapor pressure exerted by this gas mixture will be 175 psig (1210 kPa) at 70°F (21.1°C) while liquid is present. Vapor pressure will be lower if temperature is below 70°F (21.1°C); higher if temperature is above 70°F (21.1°C).
3. Cylinder must be in an upright position when discharging. Cylinder must be secured to prevent falling over.
4. Discharge valve outlet is provided with a CGA 510 valve connection which has lefthand threads. Make sure valve threads are undamaged. Do not attach ordinary pipe fittings to this valve.
5. Use metal (except aluminum) fittings and piping or Teflon-lined tubing capable of withstanding the pressures to be encountered. Install pressure relief device where liquid can be trapped between valves. Ethylene-propylene rubber and Teflon are suitable materials for gaskets. Ground all equipment, including cylinder, to avoid static sparks.
6. Install check valves in the discharge line from this cylinder to processing equipment to prevent back flow into cylinder.
7. Open cylinder valve by turning handwheel counterclockwise. Never use a wrench or other leverage device to open or close cylinder valve.

STERILIZATION
1. Use Oxyfume® 80 only in sterilizers designed for use with 80% by weight Ethylene Oxide and 20% by weight Carbon Dioxide.
2. Use Oxyfume® 80 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 effect the exposure 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.

Union Carbide Corporation—Linde Division, Danbury, CT 06817

LINDE SPECIALTY GASES

STT-0500 (3/83)

ACCEPTED

JUN 2 4 1983

Under the Federal Insecticide, Fungicide, and Rodenticide Act, as amended, for the pesticide registered under EPA Reg. No. 10330-3

MATERIAL SAFETY DATA SHEET

L-4800-A

(Essentially similar to U.S. Department of Labor Form OSHA-20)
An explanation of the terms used herein 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 OXYFUME® 80 (Liquefied Gas Mixture Under Pressure)

CHEMICAL NAME	**SYNONYMS** Sterilant mixture, 80 20
FORMULA Mixture of ethylene oxide and carbon dioxide	**CHEMICAL FAMILY**
	MOLECULAR WEIGHT

TRADE NAME OXYFUME® 80

II. HAZARDOUS INGREDIENTS

For mixtures of this product request the respective component Material Safety Data Sheets
See Section IX

MATERIAL	Wt (%)	1982 ACGIH TLV-TWA (Units)
Ethylene Oxide	80	10 ppm (20 mg·m^3) 1 ppm, A2 (1982 - Notice of intended changes) *NOTE: Currently, Union Carbide Corp. has established for its own use a TLV-TWA of 5 ppm.*
Carbon Dioxide	20	5,000 ppm (9,000 mg/m^3)

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III. PHYSICAL DATA

BOILING POINT, 760 mm. Hg		**FREEZING POINT**	
SPECIFIC GRAVITY (H_2O = 1)	0.86	**VAPOR PRESSURE AT 20 C.**	180 psig
VAPOR DENSITY (air = 1)	1.56	**SOLUBILITY IN WATER, % by wt.**	Appreciable. See Section IX
PERCENT VOLATILES BY VOLUME	100	**EVAPORATION RATE (Butyl Acetate = 1)**	High

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.

L-4800-A

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

IV. HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE See Section II

EFFECTS OF OVEREXPOSURE AND EMERGENCY AND FIRST AID PROCEDURES

Due to the presence of Ethylene Oxide (EO) in this mixture the full text of the Health Hazards section of the EO Material Safety Data Sheet is repeated below:

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.*

V. FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (test method)	Unknown	**AUTOIGNITION TEMPERATURE**	Unknown
FLAMMABLE LIMITS IN AIR, % by volume	**LOWER** 5% approx.	**UPPER**	84%

EXTINGUISHING MEDIA

Carbon dioxide, dry chemical, water spray or fog.

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.

UNUSUAL FIRE AND EXPLOSION HAZARDS – Flammable mixture. 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.

VI. REACTIVITY DATA

STABILITY	
UNSTABLE	STABLE
	X

CONDITIONS TO AVOID

Temperatures above 430°C (approximately 800°F).

INCOMPATIBILITY (materials to avoid) Alkalies and acids.

HAZARDOUS DECOMPOSITION PRODUCTS

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

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HAZARDOUS POLYMERIZATION	
May Occur	Will not Occur
X	

CONDITIONS TO AVOID – 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 V). 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 leaking assembly to well ventilated area.

Flammable vapors may spread from spill. Before entering area, especially confined areas, check atmosphere with appropriate device.

WASTE DISPOSAL METHOD

Discard any product, residue, disposable container or liner in an environmentally acceptable manner, in full compliance with federal, state, and local regulations.

Ethylene Oxide is highly toxic to most forms of life and is considered a potential environmental pollutant. Indiscriminate dumping into sewers or waterways must be avoided.

VIII. SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION (specify type)

Self contained breathing apparatus where needed.

VENTILATION	**LOCAL EXHAUST** Preferred
	MECHANICAL (general) Acceptable
	SPECIAL – – –
	OTHER – – –
PROTECTIVE GLOVES	Neoprene
EYE PROTECTION	Full face shield and safety glasses or coverall goggles.

OTHER PROTECTIVE EQUIPMENT

Metatarsal shoes for cylinder handling, safety shower, eyewash fountain. Rubber shoes and apron when risk of liquid spill exists.

IX. SPECIAL PRECAUTIONS

DANGER: Flammable, liquefied gas mixture 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 explosion-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.

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 re use.

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.

UNION CARBIDE CORPORATION
LINDE DIVISION

GENERAL OFFICES DANBURY, CT.
OFFICES IN PRINCIPAL CITIES

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Lithographed in U.S.A.