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Material Safety Data Sheet

Oxyfume® 2002 Sterilant Mixture

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME: OXYFUME® 2002 Sterilant Mixture
OTHER/GENERIC NAMES: Sterilant gas
PRODUCT USE: Sterilant gas used to sterilize medical products. Users must follow the requirements of the OSHA occupational exposure standard for ethylene oxide (29 CFR 1910.1047).
MANUFACTURER: Honeywell
101 Columbia Road
Box 1053
Morristown, New Jersey 07962-1053

FOR MORE INFORMATION CALL:
(Monday-Friday, 8:00am-5:00pm EST)
1-800-707-4555

IN CASE OF EMERGENCY CALL:
(24 Hours/Day, 7 Days/Week)
1-800-707-4555 or
Chemtrec 1-800-424-9300

2. COMPOSITION/INFORMATION ON INGREDIENTS

INGREDIENT NAME	CAS NUMBER	WEIGHT %
Ethylene Oxide	75-21-8	10.0
Chlorodifluoromethane (HCFC-22)	75-45-6	27.0
Chlorotetrafluoroethane (HCFC-124)	2837-89-0	65.0

Trace impurities and additional material names not listed above may also appear in Section 15 toward the end of the MSDS. These materials may be listed for local "Right-To-Know" compliance and for other reasons.

3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW: A colorless, liquefied, toxic gas mixture under pressure. The material has an ether-like odor at high concentrations. Do not breathe vapor. May be fatal if inhaled in high concentrations. Can cause rapid suffocation due to oxygen deficiency. Avoid contact with eyes, skin and clothing.

POTENTIAL HEALTH HAZARDS

SKIN: This mixture is a gas at normal temperature and pressure. Liquid may cause frostbite. Liquid or solutions in water may cause localized redness, inflammation, swelling and blisters. There may be a latent period of several hours prior to onset of these symptoms. Sustained contact with the skin is unlikely, but can cause headache, dizziness, nausea and vomiting. A dilute solution may penetrate skin, producing a chemical burn.

EYES: Liquid causes severe irritation, redness and swelling, and chemical burns of the cornea. Vapor causes moderate irritation resulting in redness and swelling.

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INHALATION: Causes irritation of the respiratory tract. Depending on the degree of exposure, there may be stinging of the nose and throat, coughing, chest tightness, nausea, vomiting, diarrhea, light headedness, weakness, drowsiness, cyanosis, incoordination, convulsions and coma. May be fatal if inhaled in high concentrations. May cause lung injury and the delayed onset of pulmonary edema.

INGESTION: Not a probable route of exposure. Frostbite of the lips and mouth may result from contact with the liquid. Will cause severe irritation and ulceration of the mouth and throat, abdominal pain, nausea, vomiting, collapse and coma.

DELAYED EFFECTS: At excessive levels, ethylene oxide may present cancer, reproductive, mutagenic, genotoxic, neurologic and sensitization hazards.

Ingredients found on one of the OSHA designated carcinogen lists are listed below.

INGREDIENT NAME	NTP STATUS	IARC STATUS	OSHA LIST
Ethylene oxide	Suspected carcinogen	1 - Known carcinogen	Regulated carcinogen

4. FIRST AID MEASURES

SKIN: Immediately flush skin with plenty of water while removing contaminated clothing and shoes. Wash skin with soap and water. For exposure to liquid, immediately warm frostbite area with warm water (not to exceed 105°F). Call a physician. Aerate and wash or clean contaminated clothing before reuse. Discard leather goods and shoes.

EYES: Immediately flush eyes thoroughly with water for at least 15 minutes. Immediately call a physician, preferably an opthamologist.

INHALATION: Remove to fresh air. Give artificial respiration if not breathing. Give oxygen if breathing is difficult and a qualified operator is present. Call a physician.

INGESTION: If patient is conscious, give at least two glasses of water. Do not induce vomiting. Call a physician.

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ADVICE TO PHYSICIAN: Because of possible disturbances of cardiac rhythm from overexposure to HCFCs, catecholamine drugs such as epinephrine, should be used with special caution and only in situations of emergency life support. Treatment of overexposure should be directed at the control of symptoms and the clinical conditions.

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 contact, primary irritation and blister formation may be delayed in onset.

4) When introduced directly into the bloodstream, ethylene oxide may act as hapten and lead to the development of anaphylactoid reaction of varying severity. This has been noted in a few hemodialysis and plasmapheresis patients due to desorption of ethylene oxide from the sterilized equipment. There appears to be a close associations the the presence of IgE antibodies to albumin/ethylene oxide conjugates.

5. FIRE FIGHTING MEASURES

FLAMMABLE PROPERTIES

FLASH POINT: Not applicable.
FLASH POINT METHOD: Not applicable.
AUTOIGNITION TEMPERATURE: Not determined.
UPPER FLAME LIMIT (volume % in air): 23.5% (E-681 Spark Ignition)
22.0% (E-681 Fused Wire Ignition)
LOWER FLAME LIMIT (volume % in air): 22.7% (E-681 Spark Ignition)
20.5 % (E-681 Fused Wire Iguition)
FLAME PROPAGATION RATE (solids): Not applicable.
OSHA FLAMMABILITY CLASS: Not flammable

EXTINGUISHING MEDIA:
Use media appropriate for surrounding fire.

UNUSUAL FIRE AND EXPLOSION HAZARDS:
Container may rupture due to heat of fire. No part of a container should be subjected to a temperature higher that 52°C (approximately 125°F). Containers are designed to vent contents when they are exposed to elevated temperatures. Under ordinary conditions, Oxyfume 2002 Sterilant Mixture cannot catch fire. In the event of a liquid spill and a subsequent formation of a pool of liquid, it is possible for some of the HCFC ingredients to boil off first, leaving a mixture enriched in ethylene oxide. This enriched mixture may be flammable. Avoid exposing stored Oxyfume 2002 Sterilant Mixture to heat or sources of ignition.

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SPECIAL FIRE FIGHTING PRECAUTIONS/INSTRUCTIONS:

Evacuate all personnel from danger area. Immediately cool containers with water spray from maximum distance until cool. Use self-contained breathing apparatus operated in the pressure demand mode and appropriate protective clothing. Stop flow of gas if without risk, while continuing cooling water spray. Remove all containers from area of fire if without risk.

6. ACCIDENTAL RELEASE MEASURES

IN CASE OF SPILL OR OTHER RELEASE: (Always wear recommended personal protective equipment.)

Immediately evacuate all personnel from danger area. Wear self-contained breathing apparatus operated in the pressure demand mode and appropriate protective clothing. Ethylene oxide vapors can be reduced with fog or fine water spray. Shut off leak if without risk. Flood spills with water spray. Prevent runoff, collect for disposal. Neither Oxyfume 2002 or its aqueous solutions should be discharged to streams or sewers.. Ventilate area of leak or move leaking assembly to well ventilated area. Test area, especially confined areas, for sufficient oxygen and ethylene oxide concentration prior to permitting re-entry of personnel. Emergency planning as described in 29 CFR 1910.1047, is required for handling releases, spills or emergencies associated with ethylene oxide.

Spills and releases may have to be reported to Federal and/or local authorities. See Section 15 regarding reporting requirements.

7. HANDLING AND STORAGE

NORMAL HANDLING: (Always wear recommended personal protective equipment.)

Use piping and equipment adequately designed to withstand pressures to be encountered. Use with adequate ventilation at all times. Use only in a closed system. Cylinder valves should be closed and valve plugs inserted on full or empty cylinders when not in use. 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. Do not breathe vapor. Avoid contact with skin, eyes and clothing. Wash thoroughly after handling.

STORAGE RECOMMENDATIONS:

Store in areas with adequate ventilation at all times. Keep away from heat, sparks and open flame.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

ENGINEERING CONTROLS:

Use local exhaust system with sufficient air flow velocity to maintain the concentration of ethylene oxide below its Action Level (0.5 ppm) in the worker's breathing zone. General mechanical ventilation is acceptable although local exhaust is preferred. Ventilation should be designed in such a manner that no person is exposed to concentrations of ethylene oxide exceeding the OSHA PEL of 1 ppm or the OSHA EL (Excursion Limit) of 5 ppm.

PERSONAL PROTECTIVE EQUIPMENT

SKIN PROTECTION:

Butyl rubber gloves. Gloves have a lifetime of approximately 1/2 to 1 hour after contact with liquid ethylene oxide. If risk of a liquid spill exists, also use butyl rubber shoes and apron.

EYE PROTECTION:

Full faceshield and safety glasses or goggles. Contact lenses should not be worn.

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RESPIRATORY PROTECTION:

Ethylene oxide is considered to have poor warning properties. Therefore, when exposures requiring the use of a respirator are indicated, the respirator must have either an end-of service-life indicator or be a positive pressure, full facepiece supplied air respirator for use up to 2000 ppm. See 29 CFR 1910.1047(g) for details on specific respirator selection criteria.

ADDITIONAL RECOMMENDATIONS:

Steel-toe shoes for cylinder handling, safety shower and eyewash fountain. Contaminated rubber gloves and rubber clothing should be allowed to air out for several days before cleaning and rense.

EXPOSURE GUIDELINES

INGREDIENT NAME	ACGIH TLV	OSHA PEL	OTHER LIMIT
Ethylene oxide	1 ppm TWA - 8	1 ppm TWA - 8; 5 ppm EL - 15 min.	None
Chlorodifluoromethane (HCFC-22)	1000 ppm TWA - 8	1000 ppm TWA - 8	None
Chlorotetrafluoroethane (HCFC-124)	None established	None established	*1000 ppm TWA - 8 **1000 ppm TWA - 8

* = Limit established by Honeywell.
** = Workplace Environmental Exposure Level (AIHA).
*** = Biological Exposure Index (ACGIH).

OTHER EXPOSURE LIMITS FOR POTENTIAL DECOMPOSITION PRODUCTS:

9. PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE: Clear, colorless liquid and vapor
PHYSICAL STATE: Gas at normal temperature and pressure
MOLECULAR WEIGHT: 99.9 (average)
CHEMICAL FORMULA: $CH_2CH_2O/CHClF_2/CHClFCF_3$
ODOR: Ether-like odor at high concentrations (above approximately 500 ppm)
SPECIFIC GRAVITY (water = 1.0): 1.255 @ 70°F
SOLUBILITY IN WATER (weight %): Ethylene oxide is completely miscible in water.
HCFC-22 has a water solubility of 0.3 Wt % @ 77°F (25°C)
HCFC-124 has a water solubility of 1.71 Wt % @ 75.2°F (24°C)

pH: Not applicable
BOILING POINT: -6.8°F (-21.6°C)
MELTING POINT: Not applicable
VAPOR PRESSURE: 50 psig @ 70°F (21°C)
VAPOR DENSITY (air = 1.0): 3.46
EVAPORATION RATE: High **COMPARED TO:** Butyl Acetate
% VOLATILES: 100
FLASH POINT: Not applicable
(Flash point method and additional flammability data are found in Section 5.)

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10. STABILITY AND REACTIVITY

NORMALLY STABLE? (CONDITIONS TO AVOID):

Mixture is stable at normal conditions or temperature and pressure and in ordinary use, handling and storage. Avoid mixing with air or oxygen above atmospheric pressure. Avoid open flames and high temperatures

INCOMPATIBILITIES:

Incompatible with alkali or alkaline earth metals, powdered Al, Zn, Be, etc., amines, acids, water metal chlorides, metal oxides and a wide variety of other organic and inorganic materials.

HAZARDOUS DECOMPOSITION PRODUCTS:

Thermal decomposition may form hydrochloric and hydrofluoric acids and possibly carbonyl halides, carbon monoxide and/or carbon dioxide.

HAZARDOUS POLYMERIZATION:

May occur. 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.

11. TOXICOLOGICAL INFORMATION

IMMEDIATE (ACUTE) EFFECTS:

Ethylene oxide component

LC_{50} (Mouse-Inhalation): 836 ppm/4 hr
LC_{50} (Rat-Inhalation): 1741 ppm/4hr, 5029 ppm / 1 hr
Rabbit, eye: 18 mg/6 hr, moderate irritant

Chlorodifluoromethane component

Animal studies report this material reduces heart efficiency at concentrations of 25,000 ppm or more. Cardiac Sensitization to epinephrine has been observed at concentrations of 50,000 ppm. A 2-year inhalation study indicated a slight increase in salivary gland tumors (rat) at the highest level of exposure tested (50,000 ppm). There were no observable effects in rats at exposure levels of 1000 and 10,000 ppm, and none in mice at any dose level.

Chlorotetrafluoroethane component

Acute Inhalation: 4 hr LC_{50} (rat) = 360,000 ppm
Cardiac Sensitization Threshold: 25,000 ppm (dog)
Central Nervous System Depression: 10 min EC_{50} = 140,000 ppm

DELAYED (SUBCHRONIC AND CHRONIC) EFFECTS:

Ethylene oxide component

Peripheral neuropathies have been reported from chronic inhalation. Occupational exposure to ethylene oxide has been linked with spontaneous abortions and various cancers including leukemia, stomach and pancreatic, and non-Hodgkins lymphoma.

Laboratory studies with mice have shown that acute exposure to ethylene oxide vapor at concentrations of 300 ppm and above cause testicular injury as evidenced by concentration-related increased embryonic deaths following the mating of exposed males to nonexposed females (Dominant Lethal Test). In a developmental toxicity study with rats exposed to

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ethylene oxide vapor, there was maternal toxicity at 225 ppm and 125 ppm. Fetotoxicity was present as reduced fetal body weight at all concentrations and increased incidence of skeletal varients at 225 ppm, and to a lesser extent, at 125 ppm. There were no indications of embryotoxicity or malformation. In a two-generation reproduction study involving exposure of rats to ethylene oxide vapor for 6 hrs/day, 5 days/week, there was parental toxicity at 33 and 100 ppm. The no observable effects concentration for adult toxicity, offspring effects and reproductive effects was 10 ppm.

Chlorotetrafluoroethane component

Subchronic inhalation: NOEL (rat and mouse)....15,000 ppm
2-year inhalation study (rat): no compound related visible or microscopic changes observed. NOAEL = 50,000 ppm
Not teratogenic, mutagenic or embryotoxic

Chlorodifluoromethane component

Subchronic Inhalation: NOEL = 10,000 ppm
Not teratogenic, not mutagenic in *in-vitro* and *in-vivo* studies

OTHER DATA:
None

12. ECOLOGICAL INFORMATION

Ethylene oxide component

LC_{50} (96 hr): 84 mg/L for fathead minnow.
May be dangerous if it enters water intakes. In case of release, notify local health and wildlife officials, and operators of nearby water intakes.

Chlorotetrafluoroethane component

Octanol Water Partition Coefficient: Log P_{ow} = 1.94
Low potential for bioaccumulation

Chlorodifluoromethane component

Octanol Water partition Coefficient: Unknown
Low potential for bioaccumulation

13. DISPOSAL CONSIDERATIONS

RCRA

Is the unused product a RCRA hazardous waste if discarded? Yes
If yes, the RCRA ID number is: U115

OTHER DISPOSAL CONSIDERATIONS:

Discard any product or residue in an environmentally acceptable manner, in full compliance with Federal, State and Local regulations.

The information offered here is for the product as shipped. Use and/or alterations to the product such as mixing with other materials may significantly change the characteristics of the material and alter the RCRA classification and the proper disposal method.

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14. TRANSPORT INFORMATION

US DOT HAZARD CLASS: Proper Shipping Name: Liquefied gas, n.o.s. (Chlorotetrafluoroethane, Chlorodifluoromethane and Ethylene Oxide)
Hazard Class: 2.2

US DOT ID NUMBER: UN 3163

For additional information on shipping regulations affecting this material, contact the information number found in Section 1.

15. REGULATORY INFORMATION

TOXIC SUBSTANCES CONTROL ACT (TSCA)

TSCA INVENTORY STATUS: All components are listed on the TSCA Inventory

OTHER TSCA ISSUES: HCFC-124 is subject to a SNUR published in the Federal Register on July 22, 1992 at 57 FR 32441. The SNUR codified at 40 CFR 721.3180(a)(2)(i) requires communication of the following:
Inhalation of high concentrations of vapor is harmful and may cause heart irregularities, unconsciousness, or death. Intentional misuse can be fatal. Vapor reduces oxygen available for breathing and is heavier than air. Liquid contact causes frostbite. The effects in animals from single exposure by inhalation include central nervous system effects, anesthesia and decreased blood pressure. Cardiac sensitization occurred in dogs exposed to a concentration of 2.5% in air and given an intravenous epinephrine challenge. Repeated exposures produced increased liver weights, anesthetic effects, irregular respiration, poor coordination and nonspecific effects such as decreased body weight gain. However, no irreversible effects were seen as evidenced by histopathologic evaluation. As part of an extensive toxicology program, halogenated chlorofluorocarbon-124 will be tested* in subchronic, developmental and chronic/cancer studies. Avoid breathing high concentrations of vapor. Use with sufficient ventilation to keep employee exposure below recommended limits. Avoid contact of liquid with skin and eyes. Wear chemical splash goggles and lined butyl gloves. Do not allow product to contact open flame or electrical heating elements because dangerous decomposition products may form.

* PAFT studies on HCFC-124 were completed August 1995. The tests demonstrated very low acute and subchronic inhalation toxicity. HCFC-124 did not exhibit signs of chronic toxicity, nor did it cause any tumors in a lifetime study. It is not a developmental toxicant, nor is it genotoxic.

SARA TITLE III/CERCLA

"Reportable Quantities" (RQs) and/or "Threshold Planning Quantities" (TPQs) exist for the following ingredients.

INGREDIENT NAME	SARA/CERCLA RQ (lb)	SARA EHS TPQ (lb)
Ethylene oxide	10	1000

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Spills or releases resulting in the loss of any ingredient at or above its RQ requires immediate notification to the National Response Center [(800) 424-8802] and to your Local Emergency Planning Committee.

SECTION 311 HAZARD CLASS: Immediate
Delayed
Pressure

SARA 313 TOXIC CHEMICALS:
The following ingredients are SARA 313 "Toxic Chemicals". CAS numbers and weight percents are found in Section 2.

INGREDIENT NAME	COMMENT
Ethylene oxide	None
Chlorodifluoromethane (HCFC-22)	None
Chlorotetrafluoroethane (HCFC-124)	None

STATE RIGHT-TO-KNOW

In addition to the ingredients found in Section 2, the following are listed for state right-to-know purposes.

INGREDIENT NAME	WEIGHT %	COMMENT
No ingredients listed in this section		

ADDITIONAL REGULATORY INFORMATION:
Federal Emissions Regulations for Ethylene oxide - NESHAP, 40 CFR Part 63
HCFC-124 and HCFC-22 are substances which harm public health and the environment by destroying ozone in the upper atmosphere.

WHMIS CLASSIFICATION (CANADA):
This product has been evaluated in accordance with the hazard criteria of the CPR and the MSDS contains all the information required by the CPR.

FOREIGN INVENTORY STATUS:
The components are listed on EINECS

16. OTHER INFORMATION

CURRENT ISSUE DATE: August, 2000
PREVIOUS ISSUE DATE: October, 1997

CHANGES TO MSDS FROM PREVIOUS ISSUE DATE ARE DUE TO THE FOLLOWING:
Section 1 New company name

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OTHER INFORMATION: HMIS Code: Health - 2, Fire - 0, Reactivity - 1

Sterilant Gas Bulletin

IMPORTANT: SAFETY PRACTICES FOR PEOPLE WHO MUST MOVE, HANDLE, CONNECT OR DISCONNECT OXYFUME®2002 STERILANT GAS CYLINDERS

We urge Oxyfume sterilant users to read the attached guidelines. These guidelines should be especially helpful to users who typically handle Penn Gas 2 cylinders rather than Oxyfume 2002 cylinders. They describe the do's and don'ts of handling an Oxyfume cylinder – which has different dimensions, top works and valve than does the Penn Gas cylinder.

The first document, "Safe Practices for Oxyfume Sterilant Gas Cylinder Storage and Handling," sets forth guidelines to move, handle, connect and disconnect cylinders.

The second document uses four cylinder photographs to supplement the "Safe Practices" bulletin. It shows important features that make Oxyfume cylinders different from Penn Gas cylinders.

- On Oxyfume cylinders, a cylinder cap protects the valve. Remove the cap before connecting the cylinder, and replace the cap before moving the cylinder. [Photograph I.]

- The Oxyfume cylinder valve has two "outlets." One is a spring-actuated safety relief device with a crimped cap on it. This device is designed to release all the contents of the cylinder in the event of a fire. DO NOT REMOVE THE CAP FROM THE SAFETY RELIEF DEVICE. The second outlet is the valve outlet -- with a valve plug threaded in. [Photograph II.] The valve plug is attached to the cylinder by a chain.

- After following the guidelines in the "Safe Practices" Bulletin [See Connecting the Cylinder], remove the Oxyfume valve plug using a 3/8" Allen wrench. [Photograph III and Photograph IV.]

- After disconnecting the Oxyfume cylinder, re-install the valve plug, using the 3/8" Allen wrench; and, before moving the cylinder, replace the cylinder cap. [See "Safe Practices" Bulletin, Disconnecting the Cylinder.]

Also note that: The Oxyfume cylinder height, floor to top of cylinder cap, is ~54 inches; the diameter is 10 inches. The Penn Gas cylinder height is 38.5 inches; the diameter is 13.5 inches.

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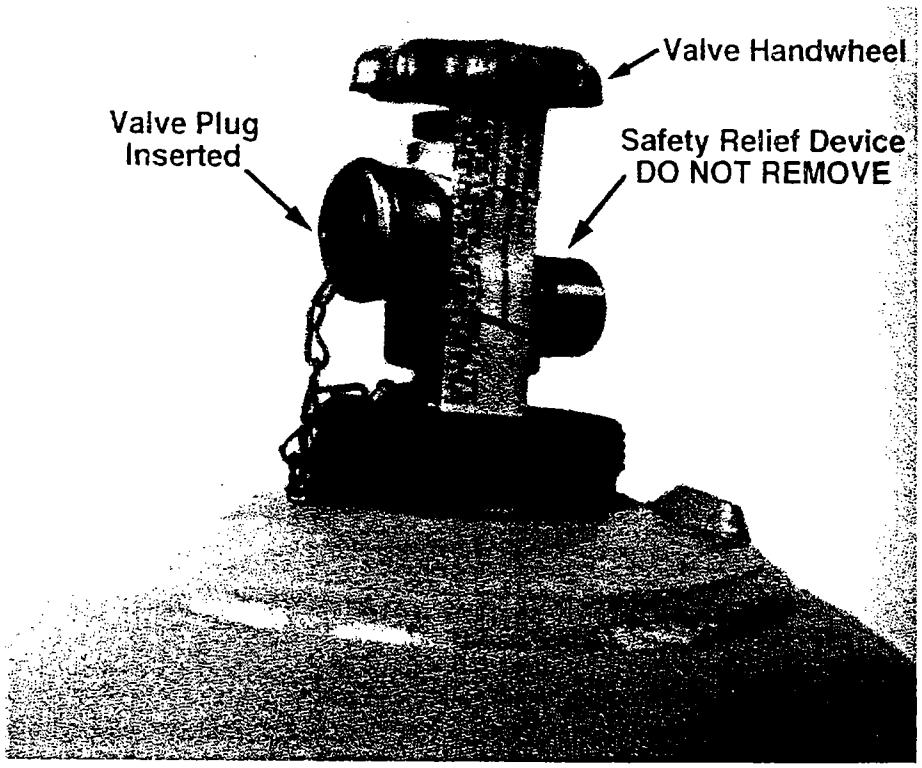
THE OXYFUME CYLINDER, CAP AND VALVE

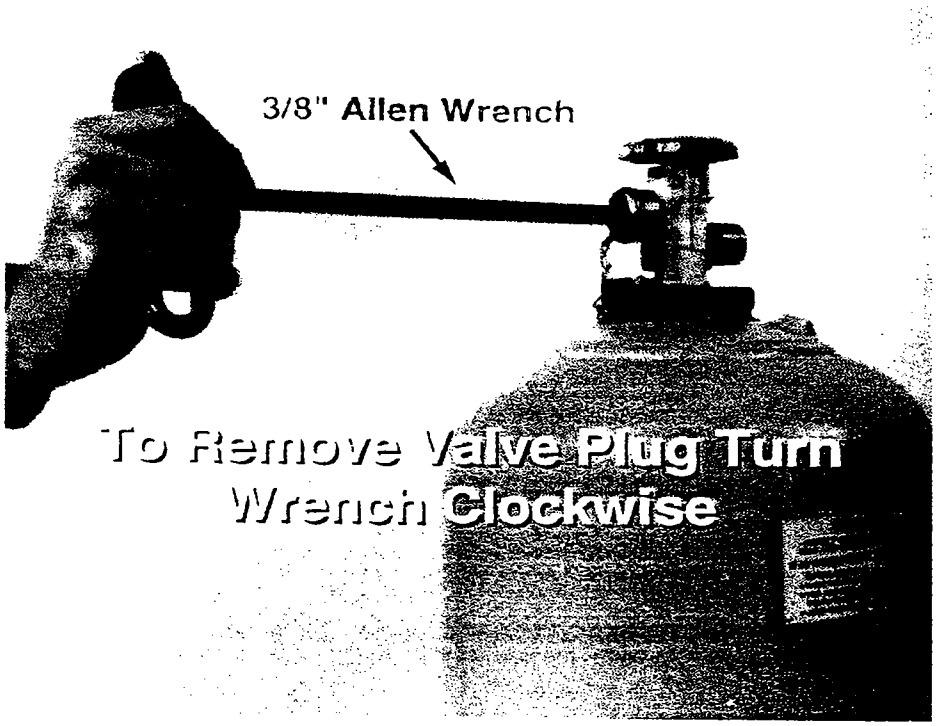
Photograph I

Photograph II

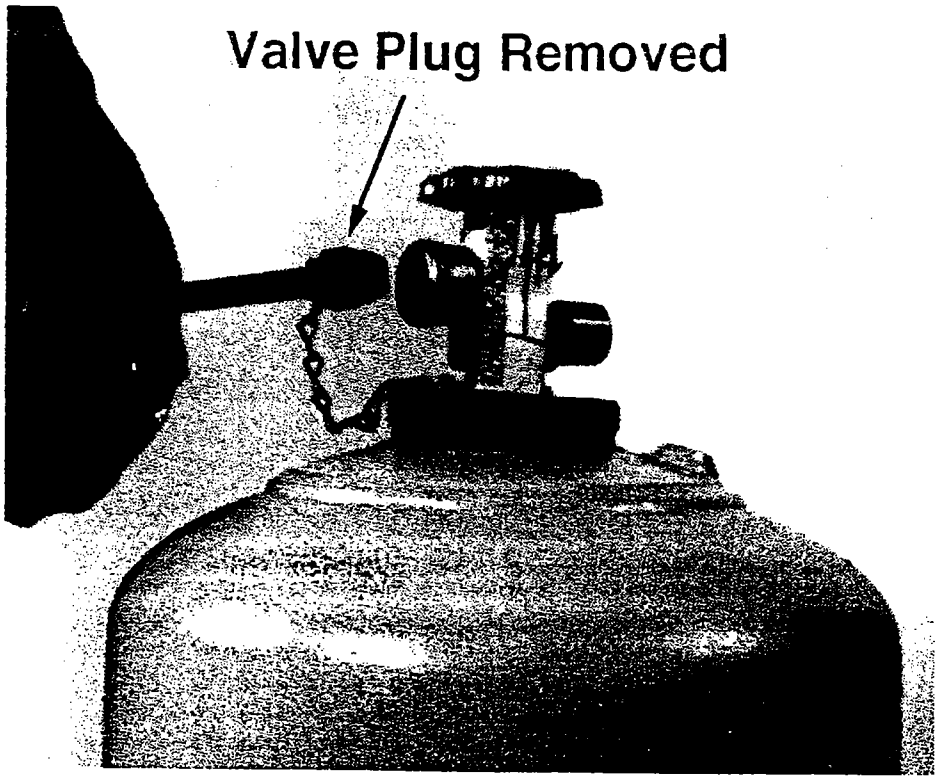


THE OXYFUME CYLINDER, CAP AND VALVE

Photograph III



Photograph IV



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SAFE PRACTICES FOR OXYFUME® STERILANT GAS CYLINDER STORAGE AND HANDLING

These guidelines should be followed when storing, moving, disconnecting and/or connecting Oxyfume sterilant gas cylinders.

Read all labels and material safety data sheets for the product. Understand the product hazards, safety and emergency procedures before handling the cylinders or product. Always use recommended personal protective equipment.

Moving And Storing Cylinders

1. **DO NOT** expose Oxyfume cylinders to temperatures above 130°F (i.e. direct sunlight, welding flames, etc.). This may cause the safety relief device to release the gas.

2. **DO NOT** move or store a cylinder without the cylinder cap in place (cylinders with protective head rings do not have caps). The cylinder cap is designed to protect the valve from being damaged if the cylinder is dropped.

3. Valve plugs must be securely in place when storing or moving a cylinder to prevent leaks if the cylinder valve is accidentally opened.

4. Keep cylinders in a secured upright position for handling, transportation or storage. Damage to the eductor tube may result if a cylinder is stored or shipped on its side.

5. Use a cylinder hand cart with a chain or strap to secure cylinder while moving to prevent losing control of the cylinder.

6. If you lose control of the cylinder, stand back and let it fall. You may be injured while trying to catch a falling cylinder. The cylinder with its cap in place is designed to withstand such a fall. In the unlikely event of a leak, follow the written emergency response plan for your facility.

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Oxyfume® Understanding Needs. Finding Solutions.

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In addition to the general guidelines listed below, read the specific instructions provided by your sterilizer manufacturer for disconnecting and connecting cylinders.

Disconnecting The Cylinder

When changing a cylinder, wear proper protective equipment including butyl rubber gloves and apron, safety glasses or goggles and a full face shield. Read MSDS for more details.

1. **DO NOT** remove the cylinder cap unless the cylinder is secured in an upright position to a mounting bracket by a strap or chain.

2. **DO NOT** stick objects inside the cylinder cap slots to remove a tight cap. This may cause the valve to be accidentally opened. Tap cap with a hammer to loosen.

3. **DO NOT** use a wrench or other mechanical device to open or close the valve. This may cause damage to the valve seat. Operate valve by hand only.

4. Before disconnecting a cylinder, close the cylinder valve and use a vacuum or purge system to vent the gas supply line.

5. The cylinder valve outlet connection has left handed threads. TURN RIGHT OR CLOCKWISE TO DISCONNECT.

6. Re-install the valve plug with a 3/8"Allen wrench. Do not over tighten. Secure the cylinder cap before moving or returning the cylinder to your supplier.

Connecting The Cylinder

1. Replace any worn or damaged CGA connections on the gas supply line.

2. Be sure that the cylinder valve is closed. Before removing the valve plug from the full cylinder, check the valve for leaks using a soap water solution (Snoop*). Inspect the valve and gas supply line connection for dirt, oil or damage before connecting. Contact your supplier if you see any cylinder valve damage. If there is damage, **DO NOT** use the cylinder.

3. Connect the gas supply line to the cylinder. TURN LEFT OR COUNTERCLOCKWISE TO TIGHTEN. **DO NOT** OVER TIGHTEN.

4. Open the cylinder valve. Check the connection for leaks using a soap water solution and/or EO monitor.

5. If a leak is detected, close cylinder valve and depressurize the gas supply line before retightening. **DO NOT** work on a pressurized line because it can cause damage to the valve or connection, resulting in exposure to the gas.

6. Repeat Step 4. If the leak cannot be stopped, close cylinder valve, depressurize the gas supply line. Disconnect the cylinder and contact your supplier. The valve may be damaged internally or the gas supply line connection may be worn.

Call your supplier or AlliedSignal if you have any questions about Oxyfume sterilant gas cylinder safety.

* Snoop® is a registered trademark of Nupro Company, Willoughby, Ohio.