

# Poison Facts:

## High Chemicals: Ethylene Oxide

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### **Properties of the Chemical**

Ethylene oxide is a highly reactive, flammable gas with a somewhat sweet odor. It dissolves easily in water. Ethylene oxide is the simplest epoxide. It is a clear, colorless liquid below its boiling point of 10 degrees C. It is explosive when heated or in the presence of alkali metal hydroxides and catalytic surfaces. Due to the fact that it is heavier than air, it can disperse along the floor to ignition sources. To reduce explosion hazard, it is mixed with inert gases such as carbon dioxide, or halocarbons such as Freon.

### **Uses of the Chemical**

Ethylene oxide is a man-made chemical that is used primarily to make ethylene glycol. A small amount is used as a fumigant and a biocide in warehouses, granaries and ship cargoes. An even smaller amount is used in the health care industry for sterilization purposes. Exposures may occur owing to faulty ventilation, poor aeration of items or faulty evacuation of ethylene oxide.

### **Absorption, Distribution, Metabolism and Excretion (ADME)**

Ethylene oxide is absorbed orally and by inhalation. It is widely distributed throughout the body.

### **Clinical Effects of Acute Exposure**

- **Ocular exposures:** Ocular irritation and injury can occur following splash exposure. Injury to the cornea can result. Contact lenses should not be worn when working with ethylene oxide.
- **Dermal exposures:** Chemical burns to the skin with blister formation can occur with solutions of ethylene oxide. Pure anhydrous ethylene oxide does not injure dry skin, but exposure to the liquid or the gas may injure moist skin. It may also cause contact dermatitis, thermal burns, frostbite, edema, erythema, vesiculation, blebs and desquamation.
- **Inhalation exposures:** Pulmonary irritation as well as pulmonary edema may be seen after exposure. Neurological effects such as syncope, lethargy, headache, dizziness and seizures have been reported. Delayed symptoms include ataxia, fatigue and weakness.
- **Ingestion exposures:** Liquid ingestion is unusual but will produce gastrointestinal distress with vomiting.

**Additional information:** The chronic and long-term effects of ethylene oxide are mainly neurological. It impairs both sensory and motor function and can result in muscular atrophy. Mutagenicity, reproductive toxicity and carcinogenicity are possible.

## **In-Field Treatment Prior to Arrival at a Health Care Facility**

- **Ocular exposures:** Eyes should be flushed immediately with copious amounts of water.
- **Dermal exposures:** Remove contaminated clothing, and wash immediately with copious amounts of water. If liquid is spilled on the skin, allow the ethylene oxide to vaporize before washing. Contaminated leather shoes or other items should be discarded.
- **Inhalation exposures:** The patient should be moved to an area of fresh air and adequate ventilation.
- **Ingestion exposures:** Oral exposure to ethylene oxide is unusual.

## **Special note to first responders:**

- Wear a positive-pressure Self-Contained Breathing Apparatus (SCBA).
- Wear chemical protective clothing that is specifically recommended by the manufacturer. It may provide little or no thermal protection.

## **Treatment of Exposures in a Health Care Facility**

- **Ocular exposures:** Exposed eyes should be irrigated with copious amounts of room-temperature water or 0.9 percent saline for at least 15 minutes. Ocular exams should include evaluation of the cornea and adjacent tissue.
- **Dermal exposures:** Skin should be washed with copious amounts of high-pressure water (shower or hose) – not just gently washed. Garments should be cleaned thoroughly with large amounts of water. Skin should be examined for burns. Dermal exposure should be treated as a chemical burn. Erythema and blisters may not be seen for 6 to 12 hours. Blister formation may occur with desquamation. Healing may take 3 to 4 weeks. Pure liquid ethylene oxide can produce frostbite.
- **Inhalation exposures:** Aggressive supportive care is necessary. Administer 100 percent humidified oxygen, perform endotracheal intubation and provide assisted ventilation as required. Beta-adrenergic antagonists may be used for bronchospasm. Due to the delayed onset of severe pulmonary edema, patients should be observed for 72 hours.
- **Ingestion exposures:** Oral exposure is unusual, and management is symptomatic.

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**For more poison prevention and first aid information, call the**

Poison Control Center

Serving the Residents of Kansas

Toll-free Hotline

1-800-222-1222

THE UNIVERSITY OF KANSAS HOSPITAL

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