

**Standard Operating Procedure for Using Ethylene Oxide**

Print a copy and keep with your Safety Data Sheets and training documents.

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| Department |  |
| Principal Investigator (PI) |  |
| PI Phone Number |  |
| Lab Manager |  |
| Lab Manager Phone Number |  |
| Emergency Contact |  |
| Emergency Contact Phone Number |  |

1. **Purpose**

The purpose of this document is to provide the information necessary to safely use ethylene oxide in the \_\_\_\_\_\_\_\_\_\_\_\_ laboratory and to comply with the OSHA standard 29 CFR 1910 Subpart Z ([CAS# 1910.1047](https://www.osha.gov/laws-regs/regulations/standardnumber/1910/1910.1047)).

1. **Hazard Identification:**

*Extremely flammable* –

* Ethylene oxide, or oxirane, is an extremely flammable gas at room temperature (flash point = -20 oC, flammable range in air 2.6%-100%). Dissolved in water, it remains flammable at a concentration of 4% by volume, making it a serious explosion hazard if poured down the drain.
* Ethylene oxide can self-polymerize violently upon exposure to heat, acid, or base. Violent reaction can occur with exposure to copper or its alloys, and rust. The heat of burning in a fire may cause the additional hazard of self-polymerization, resulting in explosion.

*Carcinogenic*–

* Ethylene oxide is classified as Category 1B carcinogen.

*Acutely toxic and corrosive to tissue --*

* Ethylene oxide is acutely toxic if inhaled, causing mucous membrane and respiratory irritation, headache, vomiting, cyanosis, drowsiness, weakness, incoordination, CNS depression, lachrymation, and labored breathing. Delayed effects may include edema of the lungs, paralysis, convulsions and death. Its odor threshold is > 250 ppm, while its permissible exposure limit is 1 ppm, therefore the sense of smell does not provide adequate protection against its toxic effects.
* Contact with the skin can cause major damage, including severe blistering. Symptoms may take several hours to appear. The response is amplified if the skin is wet or sweaty. Ethylene oxide is also a skin sensitizer and may trigger an allergic skin reaction. Contact with eyes is severely irritation and may cause irreversible damage. Contact with liquid ethylene oxide can cause severe frostbite
1. **Engineering & Administrative Controls**

Ethylene oxide must only be handled/used within the chemical fume hood, which is designed to pull air and fumes up and away from the user (Engineering Control).

All lab personnel who use ethylene oxide must be trained on the hazards of ethylene oxide, including being familiar with this SOP (Administrative Control).

The door to the \_\_\_\_\_\_\_\_\_\_\_\_ lab is posted with signage indicating the presence and hazards associated with ethylene oxide (Administrative Control).

1. **Personal Protective Equipment (PPE)**
* *Hand Protection*: NIOSH recommends butyl rubber, Teflon or Silvershield gloves.
* *Eye Protection*: OSHA recommends against contact lens use when working ethylene oxide. Safety glasses may be adequate when handling very small quantities of ethylene oxide. However, the use of tight-fitting splash goggles is highly recommended, as well as a face shield in higher splash risk situations.
* *Skin and Body Protection*: A lab coat must be worn when handling ethylene oxide.
* *Respiratory Protection*: Work with ethylene oxide should always be done in a fume hood, glove box, or in totally-sealed containers to keep exposures as low as possible.
1. **Standard Operating Procedures for Handling & Storage:**
Ethylene Oxide Handling
	1. Avoid contact with skin and eyes. Avoid inhalation.
	2. Use explosion-proof equipment and prevent buildup of electrostatic charge via appropriate grounding and bonding.
	3. Keep away from sources of ignition
	4. As they deem necessary, the PI/supervisor should insert here any information about whether a special use-area is designated for this material/process.
	5. Add appropriate lab-specific information here describing how this material(s) is generally used. E.g., name of protocol, typical frequency done, quantities used, temperature and any additional safety measures, etc.

Ethylene Oxide Storage

1. Protect containers from physical damage.
2. Keep container tightly closed in a dry and well-ventilated place.
3. Recommended storage temperature 2-8 oC. Never store above 52 oC.
4. **Chemical Disposal**

All chemical waste must be disposed of according to federal and state regulations and UNM's Chemical Hygiene Plan. Ethylene oxide and ethylene oxide-containing wastes should be placed in a suitable container and properly labeled as soon as waste is added to the container. Ethylene oxide waste should be labeled as such:

**HAZARDOUS WASTE**

**Ethylene oxide**

**Toxic, Reactive, Flammable**

Call EHS at 277-2753 to schedule a pickup of waste acrylamide and/or other waste chemicals.

1. **Spill Procedures:**

For small/minor spills (<1L), use the materials in the spill kit to clean up the spill. Minimum PPE for cleaning up an ethylene oxide spill is safety glasses/goggles, gloves and lab coat. The spill clean-up materials must be double-bagged, tightly closed, labeled and picked up by EH&S for disposal.

Spills in excess of 1L of ethylene oxide should not be cleaned up by lab personnel. In the event of a large/major spill of ethylene oxide, evacuate the area and call:

* Campus Police -- 911 on a landline or 505-277-2241 on a mobile phone, and
* Environmental Health & Safety (EH&S) – 505-277-2753 during business hours, or
* EH&S Duty Officer Pager -- 505-951-0194 (enter your phone number after the message)
1. **First Aid Procedures**

In the event of a benzene exposure, seek immediate medical attention.

* Skin Contact and Eye Contact should be washed immediately in safety shower or eyewash respectively for 15 minutes.
* If the exposure is severe, seek medical attention at the emergency room. If heading to UNMH, a non-injured person should contact the UNMH charge nurse in advance at 505-604-9349 with information on the chemical and nature of exposure.
* UNM employees should contact Employee Occupational Health Services (EOHS) at 505-272-8034.
* UNM students should contact Student Health Services at 505-277-7810.
* If the exposure occurs after hours, employees and students should seek medical treatment at a hospital emergency room.
* The supervisor of the injured person and EH&S must be notified as soon as possible after the exposure.
* The notice of Accident, Incident, or Spill form should be filled out on the EH&S website.
1. **Other Emergencies**

**Fire or Medical Emergency -- Dial 911**

**Life-Threatening Emergency, After Hours, Weekends and Holidays** – **Dial 911**

**Non-Life Threatening Emergency** – Call EH&S at 505-277-2753 to seek assistance and report the incident.

1. **Training Requirements**

All lab personnel who use ethylene oxide must take the following trainings:

* Ethylene Oxide SOP

**Principal Investigator SOP Approval**

By signing and dating here, the Principal Investigator certifies that this Standard Operating Procedure (SOP) for Using Ethylene Oxide is accurate and provides information sufficient to safely use ethylene oxide in the \_\_\_\_\_\_\_\_\_\_\_\_ laboratory.

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Signature Printed Name/Title Date

I have read and understand the content of this SOP:

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| --- | --- | --- |
| **Name** | **Signature** | **Date** |
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