Standard Operating Procedure

**Ethylene Oxide**

*This is an SOP template and is not complete until: 1) lab specific information is entered into the box below 2) lab specific protocol/procedure is added to the protocol/procedure section and
3) SOP has been signed and dated by the PI and relevant lab personnel.*

 Print a copy and insert into your
*Laboratory Safety Manual* and *Chemical Hygiene Plan*.
Refer to instructions for assistance.

|  |  |
| --- | --- |
| **Department:** | Click here to enter text. |
| **Date SOP was written:** | Click here to enter a date. |
| **Date SOP was approved by PI/lab supervisor:** | Click here to enter a date. |
| **Principal Investigator:** | Click here to enter text. |
| **Internal Lab Safety Coordinator/Lab Manager:** | Click here to enter text. |
| **Lab Phone:** | Click here to enter text. |
| **Office Phone:** | Click here to enter text. |
| **Emergency Contact:** | Click here to enter text. |
| *(Name and Phone Number)* |
| **Location(s) covered by this SOP:** | Click here to enter text. |
| *(Building/Room Number)* |

**Type of SOP:** ☐ Process ☒Hazardous Chemical ☐ Hazardous Class

**Purpose**

Ethylene oxideis an extremely flammable gas. It is available as a compressed gas. Contents are under pressure. It may explode when heated. It is toxic if inhaled and may be harmful if ingested or absorbed through the skin. Exposure causes irritation to the respiratory tract, skin, and eyes. It is classified by IARC as Group 1, carcinogenic to humans. It is a suspected reproductive toxicant. Ethylene oxide is an important chemical intermediate used for the synthesis of various industrial chemicals, most notably ethylene glycol. It is used in the manufacture of textiles, detergents, polyurethane foam, antifreeze, solvents, adhesives, cosmetics, and pharmaceuticals. It has minor use as a fumigant and disinfecting agent.

**Physical & Chemical Properties/Definition of Chemical Group**

CAS#: 75-21-8

Class: **Flammable, compressed gas, toxic by inhalation, irritant, carcinogen, mutagen, reproductive toxin**

Molecular Formula: C2H4O

Form (physical state): Liquefied gas

Color: Colorless

Boiling point: 10.7 °C

**Potential Hazards/Toxicity**

Ethylene oxideis an extremely flammable gas. Contents are under pressure. It may explode when heated. May cause a flash fire. It is toxic if inhaled and may be harmful if ingested or absorbed through the skin. It causes irritation to the respiratory tract, skin, and eyes. It is classified by IARC as Group 1, carcinogenic to humans. It may cause genetic defects. Symptoms of exposure include burning sensation, coughing wheezing, laryngitis, shortness of breath, headache, nausea, vomiting, and convulsions. May cause damage to the lungs, kidneys, liver, blood, reproductive system, and central nervous system. Ethylene oxide has a permissible exposure limit (PEL) of 1 ppm.

**Personal Protective Equipment (PPE)**

**Respirator Protection**

Use a full-face respirator with multi-purpose combination (US) respirator cartridges.

Respirators should be used only under any of the following circumstances:

* As a last line of defense (i.e., after engineering and administrative controls have been exhausted).
* When Permissible Exposure Limit (PEL) has exceeded or when there is a possibility that PEL will be exceeded.
* Regulations require the use of a respirator.
* An employer requires the use of a respirator.
* There is potential for harmful exposure due to an atmospheric contaminant (in the absence of PEL)
* As PPE in the event of a chemical spill clean-up process

Lab personnel intending to use/wear a respirator mask must be trained and fit-tested by ORS and should contact occhealt@uga.edu. This is a UGA requirement described in more detail in the [UGA Respiratory Protection Plan](https://esd.uga.edu/sites/default/files/respiratoryprotection.pdf) and supported by the [Office of Research Occupational Health and Safety Program](https://research.uga.edu/ohsp/).

**Hand Protection**

Handle with gloves. Butyl-rubber gloves are recommended for splash contact. No information was provided for nitrile gloves according to the Ansell Chemical Resistance Guide.

NOTE: Consult with your preferred glove manufacturer to ensure that the gloves you plan on using are compatible with ethylene oxide

Refer to glove selection chart from the links below:

<http://www.ansellpro.com/download/Ansell_8thEditionChemicalResistanceGuide.pdf>

OR

<http://www.allsafetyproducts.biz/page/74172>

OR

<http://www.showabestglove.com/site/default.aspx>

OR

<http://www.mapaglove.com/>

**Eye Protection**

ANSI approved, tight-fitting safety glasses/goggles. Face shields are recommended.

**Skin and Body Protection**

Flame-resistant lab coat preferably made of antistatic material, long pants, and closed-toe shoes.

**Hygiene Measures**

Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product.

**Engineering Controls**

Chemical fume hood. Adequate exhaust and capture filtration. Electrically grounded lines and equipment.

**First Aid Procedures**

**If inhaled**

Move person into fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Consult a physician.

**In case of skin contact**

Wash skin with soap and water for at least 15 minutes while removing contaminated clothing and shoes. Consult a physician.

**In case of eye contact**

Flush eyes with plenty of water for at least 15 minutes. Consult a physician.

**If swallowed**

Never give anything by mouth to an unconscious person. Ingestion is not considered a potential route of exposure. If suspected that a large amount is swallowed, seek medical attention immediately.

**Special Handling and Storage Requirements**

**Precautions for safe handling:** Avoid contact with skin, eyes, and clothing. Avoid inhalation. Use spark-proof tools and explosion-proof equipment. Keep away from heat, sparks, flames, and other sources of ignition- No smoking. Prevent build-up of electrostatic charge. Protect cylinders from physical damage.

**Conditions for safe storage:** Keep container tightly closed in a cool, dry, and well-ventilated area. Contents under pressure. Cylinders should be stored upright with valve protection cap and secured firmly to prevent falling. Recommended storage temperature is 2-8 °C. Protect from sunlight. Avoid alcohols, alkali metals, ammonia, oxidizing agents, chemically active metals, and its salts.

**Spill and Accident Procedure**

**Chemical Spill Dial 911**

**24-7 On-Call Response to Research, Environment, Health or Safety Concerns Dial 2-5561 from a campus phone or 706-542-5561 from a non-campus line.**

**Spill** – Follow the procedures set out in the [UGA Chemical and Laboratory Safety Manual.](http://research.uga.edu/docs/units/safety/manuals/Chemical-Laboratory-Safety-Manual.pdf)

[If there are any chemical-specific protocols for responding to a spill, insert them here or mark “none”:]

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# **Medical Emergency Dial 911**

**Life Threatening Emergency, After Hours, Weekends And Holidays** – Dial **911** or the emergency phone numbers listed at the beginning of the UGA Chemical and Laboratory Safety Manual

*Note: All incidents that result in an injury or property damage must be reported to ORS / ESD using a University Incident/Accident Report.*

**Non-Life Threatening Emergency** – Follow the instructions in the UGA Chemical and Laboratory Safety Manual.

*Note: All incidents that result in an injury or property damage must be reported to ORS / ESD using a University Incident/Accident Report.*

**Decontamination/Waste Disposal Procedure**

**For general hazardous waste disposal procedures, see Appendix H of the UGA Chemical and Laboratory Safety Manual.**

**Chemical Specific Procedures: [to be inserted or marked as “none”]**

Wearing proper PPE, decontaminate equipment and bench tops using soap and water. Dispose of the used chemical and contaminated disposables as hazardous waste.

**Safety Data Sheet (SDS) Location**

UGA personnel can access Online SDS through a link in the upper left corner of the ESD home page (<https://esd.uga.edu>) and logging in by using their UGA email user name and password.

**Protocol/Procedure (Add lab specific Protocol/Procedure here)**

Click here to enter text.

**NOTE**

Any deviation from this SOP requires approval from PI.

**Documentation of Training** (signature of all users is required)

* Prior to conducting any work with ethylene oxide, designated personnel must provide training to his/her laboratory personnel specific to the hazards involved in working with this substance, work area decontamination, and emergency procedures.
* The Principal Investigator must provide his/her laboratory personnel with a copy of this SOP and access to the SDS provided by the manufacturer.
* The Principal Investigator must ensure that his/her laboratory personnel have attended appropriate laboratory safety training or refresher training within the last 12 months.

**Principal Investigator SOP Approval**

Print name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Signature\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Approval Date:

I have read and understand the content of this SOP:

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