



Material Safety Data Sheet

1. Product and Company Identification

Product name : **Ethylene Oxide**

Chemical formula : C₂H₄O

Synonyms : Oxirane; Dihydrooxirene; Dimethylene oxide; Epoxyethane; 1,2-Epoxyethane; Ethene oxide; ETO; EO; Oxacyclopropane; Oxane; Oxidoethane; Alpha,Beta-Oxidoethane; Oxiran; UN 1040

Company : Specialty Gases of America, Inc
6055 Brent Dr.
Toledo, OH 43611

Telephone : 419-729-7732

Emergency : 800-424-9300

2. Composition/Information on Ingredients

Components	CAS Number	% Volume
Ethylene Oxide	75-21-8	99.7%
Water	7732-18-5	< 0.1%
Acetaldehyde	75-07-0	< 0.1%
Acetic Acid	64-19-7	< 0.1%

Component Related Regulatory Information

This product may be regulated, have exposure limits or other information identified as the following: Carbon dioxide and ethylene oxide mixtures (8070-50-6).

3. Hazards Identification

Emergency Overview

Flammable gas. May cause flash fire. May explode when heated.

Harmful if inhaled or swallowed, skin burns, eye burns, respiratory tract irritation, central nervous system depression, allergic reactions, cancer hazard (in humans).

Potential Health Effects

Inhalation : Irritation, lack of sense of smell, tearing, nausea, vomiting, diarrhea, difficulty breathing, irregular heartbeat, headache, drowsiness, symptoms of drunkenness, disorientation, bluish skin color, lung congestion, lung damage, kidney damage, paralysis, reproductive effects, convulsions. May cause cancer in long term exposure.

Eye contact : Irritation (possibly severe), frostbite, tearing.

Skin contact : Irritation (possibly severe), allergic reactions, blisters.

Ingestion : Irritation (possibly severe), sore throat, nausea, vomiting, diarrhea, stomach pain, chest pain, headache, drowsiness, symptoms of drunkenness, bluish skin color. May cause lung damage, cancer in long term exposure.

Chronic Health Hazard : None.

4. First Aid Measures

- General advice : None.
- Eye contact : Immediately wash eyes with large amounts of water, occasionally lifting upper and lower lids, until no evidence of chemical remains. Get medical attention immediately.
- Skin contact : If frostbite occurs, immediately flush with plenty of lukewarm water (105-115°F; 41-46°C). DO NOT USE HOT WATER. If warm water is not available, gently wrap affected parts in blankets. Get immediate medical attention.
- Ingestion : Contact local poison control center or physician immediately. Never make an unconscious person vomit or drink fluids. When vomiting occurs, keep head lower than hips to prevent aspiration. If person is unconscious, turn head to side. Get medical attention immediately.
- Inhalation : If adverse effects occur, remove to uncontaminated area. Give artificial respiration if not breathing. If breathing is difficult, oxygen should be administered by qualified personnel. Get immediate medical attention.
- Note to physicians : For inhalation, consider oxygen.
For ingestion, consider gastric lavage and activated charcoal slurry.

5. Fire-Fighting Measures

- Suitable extinguishing media : Carbon dioxide, regular dry chemical, water, alcohol-resistant foam.
Large fires: Use alcohol-resistant foam or flood with fine water spray.
- Specific hazards : Severe fire hazard. The vapor is heavier than air. Vapors or gases may ignite at distant ignition sources and flash back. Vapor/air mixtures are explosive.
- Fire fighting : Let burn unless leak can be stopped immediately. Move container from fire area if it can be done without risk. Fight large fires from a protected location or safe distance. Stay away from the ends of tanks. For fires in cargo or storage area: Cool containers from unmanned hose holder or monitor nozzle until well after the fire is out. If this is impossible then take the following precautions: Keep unnecessary people away, isolate hazard area and deny entry. Let the fire burn. Withdraw immediately in case of rising sound from venting safety device or any discoloration of tanks due to fire. For tank, rail car or tank truck: Evacuation radius: 1600 meters (1 mile). Do not attempt to extinguish fire unless flow of material can be stopped first. Flood with fine water spray. Do not scatter spilled material with high-pressure water streams. Apply water from a protected location or from a safe distance. Cool containers with water spray until well after the fire is out. Avoid inhalation of material or combustion by-products. Stay upwind and keep out of low areas. Evacuate if fire gets out of control or containers are directly exposed to fire. Evacuation radius: 1600 meters (1 mile). Water may be ineffective.

6. Accidental Release Measures

- Water release : Subject to California Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65). Keep out of water supplies and sewers.
- Occupational spill/release : Avoid heat, flames, sparks and other sources of ignition. Stop leak if possible without personal risk. Do not get water inside container. Small spills: Flood with water. Large spills: Dike for later disposal. Remove sources of ignition. Keep unnecessary people away, isolate hazard area and deny entry. Notify Local Emergency Planning Committee and State Emergency Response Commission for release greater than or equal to RQ (U.S. SARA Section 304). If release occurs in the U.S. and is reportable under CERCLA Section 103, notify the National Response Center at (800)424-8802 (USA) or (202)426-2675 (USA).
- Additional advice : None.

7. Handling and Storage

Handling

Secure cylinder when using to protect from falling. Use suitable hand truck to move cylinders.

Storage

Store in accordance with all current regulations and standards. Keep separated from incompatible substances. Subject to storage regulations: U.S. OSHA 29 CFR 1910.106. Protect from physical damage. Avoid contact with light. Store in a cool, dry place. Use diking sufficient to contain total contents plus 10%. Store with flammable liquids. Grounding and bonding required. Notify State Emergency Response Commission for storage or use at amounts greater than or equal to the TPQ (U.S. EPA SARA Section 302). SARA Section 303 requires facilities storing a material with a TPQ to participate in local emergency response planning (U.S. EPA 40 CFR 355 Part B).

8. Exposure Controls / Personal Protection

Exposure limits

ETHYLENE OXIDE (75-21-8)

ACGIH	:	1 ppm TWA
OSHA (final)	:	5 ppm STEL (see 29 CFR 1910.1047) 1 ppm TWA
NIOSH	:	0.1 ppm TWA less than stated value; 0.18 mg/m ³ TWA less than stated value 5 ppm Ceiling 10 min/day; 9 mg/m ³ Ceiling 10 min/day

ACETALDEHYDE (75-07-0)

ACGIH	:	25 ppm Ceiling
OSHA (final)	:	200 ppm TWA; 360 mg/m ³ TWA
OSHA (vacated)	:	100 ppm STEL; 270 mg/m ³ STEL 100 ppm TWA; 180 mg/m ³ TWA

ACETIC ACID (64-19-7)

ACGIH	:	10 ppm TWA 15 ppm STEL
OSHA (final)	:	10 ppm TWA; 25 mg/m ³ TWA
OSHA (vacated)	:	10 ppm TWA; 25 mg/m ³ TWA
NIOSH	:	15 ppm STEL; 37 mg/m ³ STEL 10 ppm TWA; 25 mg/m ³ TWA

IDLH

800 ppm

Engineering measures/Ventilation

Provide local exhaust or process enclosure ventilation system. Ensure compliance with applicable exposure limits.

Personal protective equipment

Respiratory protection	:	The following respirators and maximum use concentrations are drawn from NIOSH and/or OSHA. OSHA standard: Respirator selection should comply with 29 CFR 1910.134, 29 CFR 1910.1047, and the final rule published in the Federal Register on August 24, 2006. NIOSH recommendations: 5 ppm – Any air-purifying full-facepiece respirator (gas mask) with a chin-style, front-mounted or back-mounted canister providing protection against the compound of concern.
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End of service life indicator required (ESLI).
 Any self-contained breathing apparatus with a full facepiece.
 Emergency or unplanned entry into unknown concentrations or IDLH conditions
 – Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode.
 Any supplied-air respirator with a full facepiece that is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained breathing apparatus operated in pressure-demand or other positive-pressure mode.
 Escape – Any air-purifying full-facepiece respirator (gas mask) with a chin-style, front-mounted or back-mounted canister providing protection against the compound of concern.

- End of service life indicator required (ESLI).
 Any appropriate escape-type, self-contained breathing apparatus.
- Hand protection : For the gas: Wear appropriate chemical resistant gloves. For the liquid: Wear insulated gloves. OSHA REGULATED SUBSTANCES: U.S. OSHA 29 CFR 1910.1047.
- Eye protection : Wear splash resistant safety goggles. Provide an emergency eye wash fountain and quick drench shower in the immediate work area.
- Skin and body protection : For the gas: Wear appropriate chemical resistant clothing. For the liquid: Wear appropriate protective, cold insulating clothing. Wear appropriate chemical resistant clothing.

9. Physical and Chemical Properties

- Form : Gas.
 Color : Colorless.
 Odor : Sweet odor.
 Molecular weight : 44.06
 Vapor pressure : 1095 mmHg @ 20°C
 Vapor density : 1.5 (air = 1)
 Boiling point : 13°C
 Melting point : -111°C
 Water solubility : Soluble
 Specific gravity : 0.8824 @ 10°C
 Solvent solubility : Soluble: alcohol, ether, acetone, benzene, carbon tetrachloride, organic solvents.

10. Stability and Reactivity

- Stability : May decompose explosively when heated above 427°C.
 Conditions to avoid : Avoid heat, flames, sparks or other sources of ignition. Containers may rupture or explode if exposed to heat.
 Materials to avoid : Acids, combustible materials, bases, metal salts, metal oxides, amines, halo carbons, metals, cyanides, oxidizing materials.
 Hazardous decomposition products : Thermal decomposition products: oxides of carbon.

11. Toxicological Information

The components of this material have been reviewed in various sources and the following endpoints are published:

- ETHYLENE OXIDE : Oral LD50 Rat: 72 mg/kg
 (75-21-8)

ACETALDEHYDE : Oral LD50 Rat: 1930 mg/kg
(75-07-0)
ACETIC ACID (64- : Inhalation LC50 Rat: 11.4 mg/L/4H; Oral LD50 Rat: 3310 mg/kg; Dermal LD50
19-7) Rabbit: 1060 mg/kg
WATER (7732-18-5) : Oral LD50 Rat: > 90 mL/kg

Acute Toxicity Level

ETHYLENE OXIDE : Toxic: Inhalation, ingestion.
(75-21-8)
ACETALDEHYDE : Moderately toxic: Inhalation, ingestion.
(75-07-0) Slightly toxic: Dermal absorption.
ACETIC ACID (64- : Toxic: Inhalation.
19-7) Moderately toxic: dermal absorption, ingestion.

Component Carcinogenicity

ETHYLENE OXIDE (75-21-8)
ACGIH : A2 – Suspected Human Carcinogen.
IARC : Monograph 97 [2008]; Monograph 60 [1994] (Group 1 (carcinogenic to humans))
DFG : Category 2 (considered to be carcinogenic for man)
Present
Known Human Carcinogen

ACETALDEHYDE (75-07-0)
ACGIH : A3 – Confirmed Animal Carcinogen with Unknown Relevance to Humans.
IARC : Monograph 71 [1999]; Supplement 7 [1987]; Monograph 35 [1985] (Group 2B (possibly carcinogenic to humans))
DFG : Category 5 (low carcinogenic potency)
Present
Reasonably Anticipated To Be A Human Carcinogen

Local Effects

ETHYLENE OXIDE : Irritant: Inhalation.
(75-21-8) Corrosive: Skin, eye.
ACETALDEHYDE : Irritant: Inhalation, skin, eye.
(75-07-0)
ACETIC ACID (64- : Corrosive: Skin, eye, inhalation, ingestion.
19-7)

Target Organs

ETHYLENE OXIDE : Immune system (sensitizer), central nervous system.
(75-21-8)
ACETALDEHYDE : Immune system (sensitizer), central nervous system.
(75-07-0)

Additional Data

Alcohol may enhance the toxic effects.

12. Ecological Information

Aquatic Toxicity

ETHYLENE OXIDE : Fish: 96 Hr LC50 Pimephales promelas: 73 – 96 mg/L
(75-21-8) Invertebrate: 48 Hr LC50 Daphnia magna: 137 – 300 mg/L
ACETALDEHYDE : Fish: 96 Hr LC50 Pimephales promelas: 28.0 – 34.0 mg/L [flow-through]; 96 Hr
(75-07-0) LC50 Lepomis macrochirus: 53 mg/L [static]; 96 Hr LC50 Oncorhynchus mykiss:
1.8 – 2.4 mg/L [static]; Fish: 96 Hr LC50 Pimephales promelas: 39.8 – 46.8
mg/L [static]

Algae: 120 Hr EC50 Nitzschia linearis: 237 – 249 mg/L
 Invertebrate: 48 Hr EC50 Daphnia magna: 3.64 – 6.15 mg/L [static]; 48 Hr EC50 Daphnia magna: 48.3 mg/L
 ACETIC ACID (64-19-7) : Fish: 96 Hr LC50 Pimephales promelas: 79 mg/L [static]; 96 Hr LC50 Lepomis macrochirus: 75 mg/L [static]
 Invertebrate: 48 Hr EC50 Daphnia magna: 47 mg/L; 48 Hr EC50 Daphnia magna: 65 mg/L [static]

13. Disposal Considerations

Waste from residues / unused products Contaminated packaging Component Waste Numbers : Dispose in accordance with all applicable regulations. Subject to disposal regulations: U.S. EPA 40 CFR 262. Hazardous Waste Number(s): U115.
 : Return cylinder to supplier.
 : ETHYLENE OXIDE (75-21-8)
 RCRA: waste_number U115 (Ignitable waste, Toxic waste0
 ACETALDEHYDE (75-07-0)
 RCRA: waste_number U001 (Ignitable waste)

14. Transport Information

DOT (US only)

Proper shipping name : Ethylene Oxide
 Class : 2.3
 UN/ID No. : UN1040
 Labeling : Poison Gas, Flammable Gas
 Additional Info : Toxic-Inhalation Hazard Zone D

15. Regulatory Information

U.S. Federal Regulations

This material contains one or more of the following chemicals required under SARA Section 302/304 (40 CFR 355 Appendix A), SARA Section 313 (40 CFR 372.65), CERCLA (40 CFR 302.4), TSCA 12(b), and/or require an OSHA process safety plan.

ETHYLENE OXIDE (75-21-8) : SARA 302: 1000 lb TPQ
 10 lb final RQ; 4.54 kg final RQ
 SARA 313: 0.1% de minimis concentration
 CERCLA: 10 lb final RQ; 4.54 kg final RQ
 OSHA (safety): 5000 lb TQ
 ACETALDEHYDE (75-07-0) : 1000 lb final RQ; 454 kg final RQ
 SARA 313: 0.1% de minimis concentration
 CERCLA: 1000 lb final RQ; 454 kg final RQ
 OSHA (safety): 2500 lb TQ
 ACETIC ACID (64-19-7) : 5000 lb final RQ; 2270 kg final RQ
 CERCLA: 5000 lb final RQ; 2270 kg final RQ

SARA 311/312

Acute: Yes
 Chronic: Yes
 Fire: Yes
 Reactive: Yes
 Pressure: Yes

U.S. State Regulations

The following components appear on one or more of the following state hazardous substances lists:

Component	CAS	CA	MA	MN	NJ	PA	RI
ETHYLENE OXIDE	75-21-8	Yes	Yes	Yes	Yes	Yes	Yes
ACETALDEHYDE	75-07-0	Yes	Yes	Yes	Yes	Yes	Yes
ACETIC ACID	64-19-7	Yes	Yes	Yes	Yes	Yes	Yes

The following statement(s) are provided under the California Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65).

WARNING! This product contains a chemical known to the state of California to cause cancer.

WARNING! This product contains a chemical known to the state of California to cause reproductive/developmental effects.

16. Other Information

Prepared by : Specialty Gases of America, Inc.

For additional information, please visit our website at www.americangasgroup.com.