**ETHELENE OXIDE**

**CAUTIONARY RESPONSE INFORMATION**

**Common Synonyms**
- 1,2-Epoxyethane
- Oxirane

**Liquidified gas**
- Colorless
- Sweet odor

Floats and mixes with water. Flammable, irritating vapor is produced. Boiling point is 51°F.

**Fire**
- **FLAMMABLE**
  - Containers may explode when heated.
  - Flashback along vapor trail may occur.
  - Vapor may explode if ignited in an enclosed area.
  - Wear goggles, self-contained breathing apparatus, and rubber overclothing (including gloves).
  - Stop flow of gas if possible.
  - Contact fires from behind barrier, with unmanned hose holder or monitor noz.
  - Flood discharge area with water.
  - Cool exposed containers and protect men affecting shut off with water.
  - Extinguish with alcohol foam, dry chemical, or carbon dioxide.

**Exposure**
- CALL FOR MEDICAL AID.
  - Irritating to eyes, nose and throat.
  - If inhaled, will cause nausea, vomiting and difficult breathing.
  - Move to fresh air.
  - If breathing has stopped, give artificial respiration.

**Liquid**
- Will burn skin and eyes.
- Harmful if swallowed.
- Remove contaminated clothing and shoes.
- Flush affected areas with plenty of water.
- If IN EYES, hold eyelids open, and flush with plenty of water.
- If SWALLOWED, and victim is CONSCIOUS, have victim drink water.
- If inhaled, will cause nausea, vomiting and difficult breathing.

**Inhalation**
- If breathing has stopped, give artificial respiration.
- Move to fresh air.

**Water**
- Contains protective gloves, self-contained breathing apparatus, and rubber overclothing (including gloves).
- Stop flow of gas if possible.
- Stop spill by using sand, earth, or other material to contain spill.
- Remove all contaminated clothing and shoes.
- Wash affected areas with plenty of water.
- If SWALLOWED, and victim is CONSCIOUS, have victim drink water.
- If inhaled, will cause nausea, vomiting and difficult breathing.

**Pollution**
- Effect of low concentrations on aquatic life is unknown.
- May be dangerous if it enters water intakes.

**3. HEALTH HAZARDS**

- **3.1 Personal Protective Equipment**
  - Air-supplied mask; goggles or face shield; rubber shoes and covers.

- **3.2 Symptoms Following Exposure**
  - Exposure to low vapor concentrations often results in delayed nausea and vomiting. Higher concentrations produce irritation of eyes, nose, and throat; high concentrations may cause edema of lungs. Contact with skin causes blistering and burns.

- **3.3 Treatment of Exposure**
  - INHALATION: leave contaminated area immediately; if nausea and vomiting start, call a physician. SKIN OR EYES: flush immediately with plenty of water for at least 15 min, and seek medical attention.

- **3.4 TLV-TWA:** 1 ppm

- **3.5 TLV-STEL:** Not listed.

- **3.6 TLV-Ceiling:** Not listed.

- **3.7 Toxicity by Inhalation:** Grade 3; oral rat LD₅₀ = 33 g/kg

- **3.8 Toxicity by Inhalation:** Currently not available.

- **3.9 Chronic Toxicity:** Causes cancer in mice. Effects on humans unknown.

- **3.10 Vapor (Gas) Irritant Characteristics**
  - Vapor is moderately irritating such that personnel will not usually tolerate moderate or high vapor concentrations.

- **3.11 Liquid or Solid Characteristics**
  - Fairly severe skin irritant; may cause pain and second-degree burns after a few minutes’ contact.

- **3.12 Odor Threshold:** 50 ppm

- **3.13IDL Value:** 800 ppm

- **3.14 OSHA PEL-TWA:** 1 ppm

- **3.15 OSHA PEL-STEL:** Not listed.

- **3.16 OSHA PEL-Ceiling:** 5 ppm

- **3.17 EPA AELG:** Not listed

**4. FIRE HAZARDS**

- **4.1 Flash Point:** 0°F O.C.
- **4.2 Flammability Limits in Air:** 3%-100%
- **4.3 Fire Extinguishing Agents:** Stop flow of gas. Use water, carbon dioxide, dry chemical or alcohol foam.
- **4.4 Fire Extinguishing Agents Not to Be Used:** Not pertinent

**5. CHEMICAL REACTIVITY**

- **5.1 Reactivity with Water:** Slow reaction, not hazardous
- **5.2 Reactivity with Common Materials:** No reaction
- **5.3 Stability During Transport:** Stable
- **5.4 Neutralizing Agents for Acids and Caustics:** Not pertinent
- **5.5 Polymerization:** May polymerize violently if contaminated with alkaline or acidic materials or oxidizers.
- **5.6 Inhibitor of Polymerization:** None used.

**6. WATER POLLUTION**

- **6.1 Aquatic Toxicity:** Currently not available
- **6.2 Waterfowl Toxicity:** Currently not available
- **6.3 Biological Oxygen Demand (BOD):** Currently not available
- **6.4 Food Chain Concentration Potential:** Not relevant
- **6.5 GESAMP Hazard Profile:** Bioaccumulation: 0
  - Damage to living resources: 2
  - Human Oral hazard: 2
  - Human Contact hazard: 2
  - Reduction of amenities: XXX

**7. SHIPPING INFORMATION**

- **7.1 Grades of Purity:** Commercial: 100% Must contain no acetylene
- **7.2 Molecular Weight:** 44.05
- **7.3 Inert Atmosphere:** Inert
- **7.4 Venting:** Safety relief
- **7.5 IMO Pollution Category:** Currently not available
- **7.6 Ship Type:** Not pertinent
- **7.7 Barge Hull Type:** 1

**8. HAZARD CLASSIFICATIONS**

- **8.1 49 CFR Category:** Poison gas
- **8.2 49 CFR Class:** 2.3
- **8.3 49 CFR Package Group:** Not pertinent
- **8.4 Marine Pollutant:** No
- **8.5 NFPA Hazard Classification:** Category Classification
  - Health Hazard (Blue): 2
  - Flammability (Red): 4
  - Instability (Yellow): 3

- **8.6 EPA Reportable Quantity:** 10 pounds
- **8.7 EPA Pollution Category:** A
- **8.8 RCRA Waste Number:** U115
- **8.9 EPA FWPCA List:** Not listed

**9. PHYSICAL & CHEMICAL PROPERTIES**

- **9.1 Physical State at 15°C and 1 atm:** Gas
- **9.2 Molecular Weight:** 44.05
- **9.3 Boiling Point at 1 atm:** 51.1°F = 10.6°C = 263.8 K
- **9.4 Freezing Point:** –176.7°F = –112.6°C = 160.6 K
- **9.5 Critical Temperature:** 384.8°F = 196°C = 786.9 K
- **9.6 Critical Pressure:** 1040 psi = 71.0 atm = 7.2 MN/m²
- **9.7 Specific Gravity:** 0.869 at 20°C (liquid)
- **9.8 Liquid Surface Tension:** 24.3 dynes/cm = 0.0243 N/m at 20°C
- **9.9 Liquid Water Interfaceal Tension:** Not pertinent
- **9.10 Vapor (Gas) Specific Gravity:** 1.5
- **9.11 Ratio of Specific Heats of Vapor (Gas):** 1.212
- **9.12 Latent Heat of Vaporization:** 249.3 Btu/lb = 138.5 cal/g = 5.799 X 10⁶ J/kg
- **9.13 Heat of Combustion:** –114.80 Btu/lb = –460.00 cal/g = –202.1 X 10⁵ J/kg
- **9.14 Heat of Decomposition:** Not pertinent
- **9.15 Heat of Solution:** –1.20 Btu/lb = –34 cal/g = –1.4 X 10⁵ J/kg
- **9.16 Heat of Polymerization:** Not pertinent
- **9.17 Heat of Fusion:** 28.07 cal/g
- **9.18 Limiting Values:** Currently not available
- **9.19 Reid Vapor Pressure:** 38.5 psi

**NOTES**

**JUNE 1999**
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