ETHYLENE OXIDE

EOX

CAUTIONARY RESPONSE INFORMATION

Common Synonyms
1,2-Epoxyethane
Oxirane

Liquefied gas Colorless Sweet odor

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

Evacuate.
Keep people away. Avoid contact with liquid.
Avoid inhalation.
Wear goggles, self-contained breathing apparatus, and rubber overclothing (including gloves).
Shut off ignition sources and call fire department.
Stay upwind and use water spray to ``knock down'' vapor.
Notify local health and pollution control agencies.
Protect water intakes.

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.
Combat fires from behind barrier, with unmanned hose holder or monitor noz.
Flood discharge area with water.
Cool exposed containers and protect men effecting 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.
If breathing is difficult, give oxygen.

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 or milk.

Water Pollution

Effect of low concentrations on aquatic life is unknown.
May be dangerous if it enters water intakes.
Notify local health and wildlife officials.
Notify operators of nearby water intakes.

1. CORRECTIVE RESPONSE ACTIONS

Dilute and disperse
Stop discharge

2. CHEMICAL DESIGNATIONS

2.1 CG Compatibility Group: 0; Unassigned cargoes
2.2 Formula: CH_2CH_2O
2.3 IMO/UN Designation: 2.0/1040
2.4 DOT ID No.: 1040
2.5 CAS Registry No.: 75-21-8
2.6 NAERG Guide No.: 119
2.7 Standard Industrial Trade Classification: 51615

3. HEALTH HAZARDS

3.1 Personal Protective Equipment: Air-supplied mask; goggles or face shield; rubber shoes and coveralls.
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 Ingestion: Grade 3; oral rat LD_{50} = .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
3.13 IDLH 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 AEGL: Not listed

4. FIRE HAZARDS

4.1 Flash Point: <0°F O.C.
4.2 Flammable 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
4.5 Special Hazards of Combustion Products: Irritating vapors generated when heated.
4.6 Behavior in Fire: Vapor is heavier than air and may travel considerable distance to a source of ignition and flash back. Con- tainers may explode when heated.
4.7 Auto Ignition Temperature: 804°F
4.8 Electrical Hazards: Class I, group B
4.9 Burning Rate: 3.5 mm/min.
4.10 Adiabatic Flame Temperature: Currently not available
4.11 Stoichometric Air to Fuel Ratio: 11.9 (calc.)
4.12 Flame Temperature: Currently not available
4.13 Combustion Molar Ratio (Reactant to Product): 4.0 (calc.)
4.14 Minimum Oxygen Concentration for Combustion (MOCC): Not listed

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 and metal oxides or chlorides.
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: None
6.5 GESAMP Hazard Profile:
Bioaccumulation: 0
Damage to living resources: 2
Human Oral hazard: 2
Human Contact hazard: II
Reduction of amenities: XXX

7. SHIPPING INFORMATION

7.1 Grades of Purity: Commercial: 100% Must contain no acetylene
7.2 Storage Temperature: Ambient
7.3 Inert Atmosphere: Inerted
7.4 Venting: Safety relief
7.5 IMO Pollution Category: Currently not available
7.6 Ship Type: 1
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 = 283.8°K
9.4 Freezing Point: –170.7°F = –112.6°C = 160.6°K
9.5 Critical Temperature: 384.8°F = 196°C = 469.2°K
9.6 Critical Pressure: 1040 psia = 71.0 atm = 7.2 MN/m^2
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 Interfacial 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 10^5 J/kg
9.13 Heat of Combustion: –11,480 Btu/lb = –6380 cal/g = –267.1 X 10^5 J/kg
9.14 Heat of Decomposition: Not pertinent
9.15 Heat of Solution: –61 Btu/lb = –34 cal/g = –1.4 X 10^5 J/kg
9.16 Heat of Polymerization: Not pertinent
9.17 Heat of Fusion: 28.07 cal/g
9.18 Limiting Value: Currently not available
9.19 Reid Vapor Pressure: 38.5 psia

NOTES

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9.20 SATURATED LIQUID DENSITY

Temperature (degrees F)	Pounds per cubic foot
-55	60.020
-50	59.790
-45	59.560
-40	59.330
-35	59.100
-30	58.870
-25	58.640
-20	58.410
-15	58.181
-10	57.950
-5	57.720
0	57.490
5	57.250
10	57.020
15	56.790
20	56.550
25	56.321
30	56.090
35	55.850
40	55.620
45	55.380
50	55.150

9.21 LIQUID HEAT CAPACITY

Temperature (degrees F)	British thermal unit per pound-F
-70	0.442
-60	0.445
-50	0.447
-40	0.449
-30	0.451
-20	0.453
-10	0.456
0	0.458
10	0.460
20	0.462
30	0.465
40	0.467
50	0.469

9.22 LIQUID THERMAL CONDUCTIVITY

Temperature (degrees F)	British thermal unit inch per hour-square foot-F
	NOT PERTINENT

9.23 LIQUID VISCOSITY

Temperature (degrees F)	Centipoise
	NOT PERTINENT

9.24 SOLUBILITY IN WATER

Temperature (degrees F)	Pounds per 100 pounds of water
	MISCIBLE

9.25 SATURATED VAPOR PRESSURE

Temperature (degrees F)	Pounds per square inch
-35	1.581
-30	1.845
-25	2.145
-20	2.486
-15	2.871
-10	3.305
-5	3.793
0	4.340
5	4.952
10	5.633
15	6.392
20	7.233
25	8.164
30	9.193
35	10.330
40	11.570
45	12.940
50	14.440
55	16.070
60	17.850
65	19.800
70	21.910
75	24.200
80	26.680
85	29.360
90	32.260

9.26 SATURATED VAPOR DENSITY

Temperature (degrees F)	Pounds per cubic foot
-35	0.01528
-30	0.01762
-25	0.02025
-20	0.02320
-15	0.02650
-10	0.03016
-5	0.03423
0	0.03875
5	0.04373
10	0.04922
15	0.05526
20	0.06188
25	0.06913
30	0.07704
35	0.08566
40	0.09503
45	0.10520
50	0.11620
55	0.12810
60	0.14100
65	0.15480
70	0.16970
75	0.18570
80	0.20290
85	0.22120
90	0.24080

9.27 IDEAL GAS HEAT CAPACITY

Temperature (degrees F)	British thermal unit per pound-F
0	0.227
25	0.239
50	0.250
75	0.261
100	0.272
125	0.283
150	0.293
175	0.304
200	0.315
225	0.325
250	0.335
275	0.345
300	0.355
325	0.365
350	0.375
375	0.385
400	0.394
425	0.404
450	0.413
475	0.422
500	0.431
525	0.440
550	0.449
575	0.458
600	0.466