SAFETY DATA SHEET

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers

Product name: Ethylene oxide

Product Number: 387614
Brand: Aldrich
Index-No.: 603-023-00-X
CAS-No.: 75-21-8

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses: Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company: Sigma-Aldrich Inc.
3050 SPRUCE ST
ST. LOUIS MO  63103
UNITED STATES

Telephone: +1 314 771-5765
Fax: +1 800 325-5052

1.4 Emergency telephone

Emergency Phone #: 800-424-9300 CHEMTREC (USA) +1-703-527-3887 CHEMTREC (International) 24 Hours/day; 7 Days/week

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)

- Flammable gases (Category 1), H220
- Gases under pressure (Liquefied gas), H280
- Acute toxicity, Oral (Category 3), H301
- Acute toxicity, Inhalation (Category 3), H331
- Skin corrosion (Category 1B), H314
- Serious eye damage (Category 1), H318
- Germ cell mutagenicity (Category 1B), H340
- Carcinogenicity (Category 1B), H350
- Reproductive toxicity (Category 1B), H360
Specific target organ toxicity - single exposure (Category 3), Respiratory system, Central nervous system, H335, H336
Specific target organ toxicity - repeated exposure (Category 1), Nervous system, H372
Short-term (acute) aquatic hazard (Category 3), H402

For the full text of the H-Statements mentioned in this Section, see Section 16.

### 2.2 GHS Label elements, including precautionary statements

**Pictogram**

![Pictogram]

**Signal Word** Danger

**Hazard statement(s)**

- H220 Extremely flammable gas.
- H280 Contains gas under pressure; may explode if heated.
- H301 + H331 Toxic if swallowed or if inhaled.
- H314 Causes severe skin burns and eye damage.
- H335 May cause respiratory irritation.
- H336 May cause drowsiness or dizziness.
- H340 May cause genetic defects.
- H350 May cause cancer.
- H360 May damage fertility or the unborn child.
- H372 Causes damage to organs (Nervous system) through prolonged or repeated exposure.
- H402 Harmful to aquatic life.

**Precautionary statement(s)**

- P201 Obtain special instructions before use.
- P202 Do not handle until all safety precautions have been read and understood.
- P210 Keep away from heat/ sparks/ open flames/ hot surfaces. No smoking.
- P260 Do not breathe gas.
- P264 Wash skin thoroughly after handling.
- P270 Do not eat, drink or smoke when using this product.
- P271 Use only outdoors or in a well-ventilated area.
- P273 Avoid release to the environment.
- P280 Wear protective gloves/ protective clothing/ eye protection/ face protection.
- P301 + P310 + P330 IF SWALLOWED: Immediately call a POISON CENTER/ doctor. Rinse mouth.
- P301 + P330 + P331 IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.
- P303 + P361 + P353 IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/ shower.
- P304 + P340 + P310 IF INHALED: Remove person to fresh air and keep comfortable for breathing. Immediately call a POISON CENTER/ doctor.
- P305 + P351 + P338 + P310 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a POISON CENTER/ doctor.
- P308 + P313 IF exposed or concerned: Get medical advice/ attention.
- P363 Wash contaminated clothing before reuse.
- P377 Leaking gas fire: Do not extinguish, unless leak can be stopped safely.
2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

SECTION 3: Composition/information on ingredients

3.1 Substances
Synonyms: Oxirane

<table>
<thead>
<tr>
<th>Component</th>
<th>Classification</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>ethylene oxide</td>
<td>Flam. Gas 1; Press. Gas Liquefied gas; Acute Tox. 3; Skin Corr. 1B; Eye Dam. 1; Muta. 1B; Carc. 1B; Repr. 1B; STOT SE 3; STOT RE 1; Aquatic Acute 3; H220, H280, H301, H331, H314, H318, H340, H350, H360, H335, H336, H372, H402</td>
<td>&lt;= 100 %</td>
</tr>
</tbody>
</table>

For the full text of the H-Statements mentioned in this Section, see Section 16.

SECTION 4: First aid measures

4.1 Description of first-aid measures

General advice
First aiders need to protect themselves. Show this material safety data sheet to the doctor in attendance.

If inhaled
After inhalation: fresh air. Immediately call in physician. If breathing stops: immediately apply artificial respiration, if necessary also oxygen.

In case of skin contact
In case of skin contact: Take off immediately all contaminated clothing. Rinse skin with water/ shower. Call a physician immediately.
**In case of eye contact**
After eye contact: rinse out with plenty of water. Immediately call in ophthalmologist. Remove contact lenses.

**If swallowed**
If swallowed: give water to drink (two glasses at most). Seek medical advice immediately. In exceptional cases only, if medical care is not available within one hour, induce vomiting (only in persons who are wide awake and fully conscious), administer activated charcoal (20 - 40 g in a 10% slurry) and consult a doctor as quickly as possible. Do not attempt to neutralise.

4.2 **Most important symptoms and effects, both acute and delayed**
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 **Indication of any immediate medical attention and special treatment needed**
No data available

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**SECTION 5: Firefighting measures**

5.1 **Extinguishing media**

**Suitable extinguishing media**
Water Foam Carbon dioxide (CO2) Dry powder

**Unsuitable extinguishing media**
For this substance/mixture no limitations of extinguishing agents are given.

5.2 **Special hazards arising from the substance or mixture**
Carbon oxides
Combustible.
Pay attention to flashback.
Vapors are heavier than air and may spread along floors.
Development of hazardous combustion gases or vapours possible in the event of fire.

5.3 **Advice for firefighters**
Stay in danger area only with self-contained breathing apparatus. Prevent skin contact by keeping a safe distance or by wearing suitable protective clothing.

5.4 **Further information**
Remove container from danger zone and cool with water. Prevent fire extinguishing water from contaminating surface water or the ground water system.

---

**SECTION 6: Accidental release measures**

6.1 **Personal precautions, protective equipment and emergency procedures**
Advice for non-emergency personnel: Do not breathe gas. Avoid substance contact. Ensure adequate ventilation. Evacuate the danger area, observe emergency procedures, consult an expert.
For personal protection see section 8.

6.2 **Environmental precautions**
Do not let product enter drains.
SECTION 7: Handling and storage

7.1 Precautions for safe handling

Advice on safe handling
Work under hood. Do not inhale substance/mixture. Avoid generation of vapours/aerosols.

Advice on protection against fire and explosion
Keep away from open flames, hot surfaces and sources of ignition.

Hygiene measures
Immediately change contaminated clothing. Apply preventive skin protection. Wash hands and face after working with substance.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Storage conditions
Tightly closed. Keep locked up or in an area accessible only to qualified or authorized persons. Keep away from combustible materials and sources of ignition.

Storage stability
Recommended storage temperature
2 - 8 °C

Storage class
Storage class (TRGS 510): 2A: Gases

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Ingredients with workplace control parameters

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS-No.</th>
<th>Value</th>
<th>Control parameters</th>
<th>Basis</th>
</tr>
</thead>
<tbody>
<tr>
<td>ethylene oxide</td>
<td>75-21-8</td>
<td>TWA</td>
<td>1 ppm</td>
<td>USA. Occupational Exposure Limits (OSHA) - Table Z-1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>STEL</td>
<td>5 ppm</td>
<td>USA. Occupational Exposure Limits (OSHA) - Table Z-1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TWA</td>
<td>1 ppm</td>
<td>USA. ACGIH Threshold Limit Values (TLV)</td>
</tr>
<tr>
<td>Remarks</td>
<td></td>
<td></td>
<td></td>
<td>Central Nervous System impairment Cancer</td>
</tr>
</tbody>
</table>
Suspected human carcinogen

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>TWA</td>
<td>1 ppm</td>
<td>USA. Table Z-1-A Limits for Air Contaminants (1989 vacated values)</td>
<td></td>
</tr>
<tr>
<td>STEL</td>
<td>5 ppm</td>
<td>USA. Table Z-1-A Limits for Air Contaminants (1989 vacated values)</td>
<td></td>
</tr>
</tbody>
</table>

Substance listed; for more information see OSHA document 1910.1047

See 1910.1047

C | 5 ppm | 9 mg/m³ | USA. NIOSH Recommended Exposure Limits |

Potential Occupational Carcinogen

See Appendix A

10 minute per day ceiling value

### Biological occupational exposure limits

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS-No.</th>
<th>Parameters</th>
<th>Value</th>
<th>Biological specimen</th>
<th>Basis</th>
</tr>
</thead>
<tbody>
<tr>
<td>ethylene oxide</td>
<td>75-21-8</td>
<td>N-(2-hydroxyethyl)valine (HEV) hemoglobin adducts</td>
<td>5000 pmol HEV/g globin</td>
<td>Biological Exposure Indices (BEI)</td>
<td></td>
</tr>
</tbody>
</table>

Remarks
Not critical

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS-No.</th>
<th>Parameters</th>
<th>Value</th>
<th>Biological specimen</th>
<th>Basis</th>
</tr>
</thead>
<tbody>
<tr>
<td>S-(2-hydroxyethyl)mercapturic acid (HEMA)</td>
<td></td>
<td></td>
<td>5 µg HEMA/g creatinine</td>
<td>Urine</td>
<td>ACGIH - Biological Exposure Indices (BEI)</td>
</tr>
</tbody>
</table>

End of shift

### 8.2 Exposure controls

**Appropriate engineering controls**
Immediately change contaminated clothing. Apply preventive skin protection. Wash hands and face after working with substance.

**Personal protective equipment**

**Eye/face protection**
Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU). Tightly fitting safety goggles

**Body Protection**
Flame retardant antistatic protective clothing.

**Respiratory protection**
required when vapours/mists are generated. Our recommendations on filtering respiratory protection are based on the following standards: DIN EN 143, DIN 14387 and other accompanying standards relating to the used respiratory protection system.
### SECTION 9: Physical and chemical properties

#### 9.1 Information on basic physical and chemical properties

<table>
<thead>
<tr>
<th>Property</th>
<th>Details</th>
</tr>
</thead>
</table>
| a) Appearance                   | Form: Liquefied gas  
Color: colorless                                                                 |
| b) Odor                          | ethereal, fruity                                                      |
| c) Odor Threshold               | No data available                                                      |
| d) pH                            | 7.0 at 20 °C (68 °F)                                                 |
| e) Melting point/freezing point | Melting point/range: -111 °C (-168 °F) - lit.                          |
| f) Initial boiling point         | 10.7 °C 51.3 °F - lit.                                                |
| g) Flash point                   | -20.0 °C (-4.0 °F) - closed cup                                        |
| h) Evaporation rate              | No data available                                                      |
| i) Flammability (solid, gas)     | Chemically unstable at 20 °C temperature and a standard pressure of 101.3 kPa |
| j) Upper/lower flammability or   | Upper explosion limit: 99 % (V)                                       |
| explosive limits                 | Lower explosion limit: 3 % (V)                                        |
| k) Vapor pressure                | 1,456 hPa at 20 °C (68 °F)                                            |
| l) Vapor density                 | No data available                                                      |
| m) Density                       | 0.882 g/cm³ at 25 °C (77 °F) - lit.                                   |
|                                 | Relative density 1.9500 °C                                             |
| n) Water solubility              | miscible in all proportions                                           |
| o) Partition coefficient: n-     | log Pow: -0.3 at 25 °C (77 °F) - Bioaccumulation is not expected.     |
| octanol/water                    |                                                                         |
| p) Autoignition temperature      | 429.0 °C (804.2 °F) at 1,013 hPa                                      |
| q) Decomposition temperature     | No data available                                                      |
| r) Viscosity                     | No data available                                                      |
| s) Explosive properties          | Explosive with or without contact with air.                           |
| t) Oxidizing properties          | none                                                                   |

#### 9.2 Other safety information

No data available
SECTION 10: Stability and reactivity

10.1 Reactivity
No data available

10.2 Chemical stability
The product is chemically stable under standard ambient conditions (room temperature).

10.3 Possibility of hazardous reactions
Violent reactions possible with:
- Oxidizing agents
- Alcohols
- Alkali metals
- Ammonia

10.4 Conditions to avoid
no information available

10.5 Incompatible materials
No data available

10.6 Hazardous decomposition products
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - 72.0 mg/kg
Remarks: (RTECS)
LC50 Inhalation - Rat - male and female - 4 h - 2.76 mg/l - vapor

(OECD Test Guideline 403)
Dermal: No data available

Skin corrosion/irritation
Skin - Rabbit
Result: Causes burns.
Remarks: (ECHA)
Remarks: Classified according to Regulation (EU) 1272/2008, Annex VI (Table 3.1/3.2)

Serious eye damage/eye irritation
Remarks: Causes serious eye damage.

Respiratory or skin sensitization
No data available

Germ cell mutagenicity
May cause genetic defects.

Carcinogenicity
Presumed to have carcinogenic potential for humans
IARC: 1 - Group 1: Carcinogenic to humans (ethylene oxide)
The life science business of Merck KGaA, Darmstadt, Germany operates as MilliporeSigma in the US and Canada

NTP: Known - Known to be human carcinogen (ethylene oxide)
OSHA: OSHA specifically regulated carcinogen (ethylene oxide)

**Reproductive toxicity**
May damage the unborn child.
May damage fertility.

**Specific target organ toxicity - single exposure**
Inhalation - May cause respiratory irritation. - Respiratory system
Remarks: Classified according to Regulation (EU) 1272/2008, Annex VI (Table 3.1/3.2)
May cause drowsiness or dizziness. - Nervous system
Remarks: Classified according to Regulation (EU) 1272/2008, Annex VI (Table 3.1/3.2)

**Specific target organ toxicity - repeated exposure**
Causes damage to organs through prolonged or repeated exposure.
- Nervous system
Remarks: Classified according to Regulation (EU) 1272/2008, Annex VI (Table 3.1/3.2)

**Aspiration hazard**
No data available

11.2 **Additional Information**
RTECS: KX2450000
burning sensation, Cough, wheezing, laryngitis, Shortness of breath, Headache, Nausea, Vomiting, Exposure to large amounts can cause:, Convulsions
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

**SECTION 12: Ecological information**

12.1 **Toxicity**

**Toxicity to fish**
static test LC50 - Pimephales promelas (fathead minnow) - 84 mg/l - 96 h (US-EPA)

**Toxicity to daphnia and other aquatic invertebrates**
static test LC50 - Daphnia magna (Water flea) - 212 mg/l - 48 h (US-EPA)

**Toxicity to algae**
static test ErC50 - Pseudokirchneriella subcapitata - 240 mg/l - 96 h (US-EPA)

**Toxicity to bacteria**
static test EC50 - activated sludge - > 713 mg/l - 3 h (OECD Test Guideline 209)

12.2 **Persistence and degradability**

**Biodegradability**
aerobic - Exposure time 28 d
Result: 96 % - Readily biodegradable. (OECD Test Guideline 301C)

12.3 **Bioaccumulative potential**
No data available
12.4 Mobility in soil  
No data available  

12.5 Results of PBT and vPvB assessment  
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted  

12.6 Endocrine disrupting properties  
No data available  

12.7 Other adverse effects  
No data available  

SECTION 13: Disposal considerations  

13.1 Waste treatment methods  

Product  
Waste material must be disposed of in accordance with the national and local regulations. Leave chemicals in original containers. No mixing with other waste. Handle uncleaned containers like the product itself. Pressurised gas bottle: dispose of only in empty condition!  

SECTION 14: Transport information  

DOT (US)  
UN number: 1040   Class: 2.3 (2.1)  
Proper shipping name: Ethylene oxide  
Reportable Quantity (RQ): 10 lbs  
Poison Inhalation Hazard: Hazard Zone D  

IMDG  
UN number: 1040   Class: 2.3 (2.1)  
Proper shipping name: ETHYLENE OXIDE  
EMS-No: F-D, S-U  

IATA  
UN number: 1040   Class: 2.3 (2.1)  
Proper shipping name: Ethylene oxide  
IATA Passenger: Not permitted for transport  
IATA Cargo: Not permitted for transport  

SECTION 15: Regulatory information  

SARA 302 Components  
ethylene oxide  
CAS-No.  
75-21-8  
Revision Date  
2013-02-08  

SARA 313 Components  

Aldrich - 387614
The following components are subject to reporting levels established by SARA Title III, Section 313:

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS-No.</th>
<th>Revision Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>ethylene oxide</td>
<td>75-21-8</td>
<td>2013-02-08</td>
</tr>
</tbody>
</table>

**SARA 311/312 Hazards**

Fire Hazard, Sudden Release of Pressure Hazard, Acute Health Hazard, Chronic Health Hazard

**Massachusetts Right To Know Components**

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS-No.</th>
<th>Revision Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>ethylene oxide</td>
<td>75-21-8</td>
<td>2013-02-08</td>
</tr>
</tbody>
</table>

**Pennsylvania Right To Know Components**

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS-No.</th>
<th>Revision Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>ethylene oxide</td>
<td>75-21-8</td>
<td>2013-02-08</td>
</tr>
</tbody>
</table>

**California Prop. 65 Components**

, which is/are known to the State of California to cause cancer and birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov.ethylene oxide

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS-No.</th>
<th>Revision Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>ethylene oxide</td>
<td>75-21-8</td>
<td>2009-02-01</td>
</tr>
</tbody>
</table>

**SECTION 16: Other information**

**Further information**

The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.