Safety Data Sheet(SDS)

Revision date : 01-06-2026

1. Identification

1) Product identifier : HPEO_ETHYLENE_OXIDE

2) Relevant identified uses of the substance or mixture and uses advised against

○ Relevant identified uses

1.Raw materials and intermediates

○ Restrictions on use

Use for recommended use only
Do not use it for weapons manufacturing and related purposes.

3) Supplier information

○ Seller

Company name : Lotte Daesan Petrochem Corporation
Address : 82 Dokgot 1-ro, Daesan-eup, Seosan-si, Chungcheongnam-do
Telephone number : +82-41-689-5114
Emergency phone number : (Control Room) +82-41-689-5119
Fax number : +82-41-689-5985

2. Hazards identification

1) Hazard classification

- Flammable gases Category 1
- Gases under pressure Liquefied gas
- Acute toxicity(Oral) Category 3
- Acute toxicity(Inhalation:Gases) Category 3
- Skin corrosion/irritation Category 2
- Serious eye damage/eye irritation Category 2
- Carcinogenicity Category 1
- Germ cell mutagenicity Category 1
- Specific target organ toxicity single exposure Category 3(Respiratory tract irritation)

2) Allocation label elements

Hazard pictograms

Signal word

- DANGER

Hazard statements

H220 Extremely flammable gas
H280 Contains gas under pressure; may explode if heated
H301 Toxic if swallowed
H315 Causes skin irritation
H319 Causes serious eye irritation
H331 Toxic if inhaled
H335 May cause respiratory irritation
H340 May cause genetic defects
H350 May cause cancer

Precautionary statements

- Prevention

P201 Obtain special instructions before use.
P202 Do not handle until all safety precautions have been read and understood.
P210 Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
P261 Avoid breathing dust/fume/gas/mist/vapours/spray.
P264 Avoid contact during pregnancy/ while nursing.
P270 Do not eat, drink or smoke when using this product.
P271 Use only outdoors or in a wellventilated area.
P280 Wear protective gloves/ protective clothing/ eye protection/ face protection.

- Response

P301+P310 IF SWALLOWED: Call a POISON CENTER / toxins center / physician.
P302+P352 IF ON SKIN: Wash with plenty of soap and water.
P304+P340 IF INHALED: Remove person to fresh air and keep comfortable for breathing.
P305+P351+P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P308+P313 If exposed or concerned: Get medical advice/attention.
P311 Call a POISON CENTER / toxins center / physician.
P312 Discomfort call a POISON CENTER / toxins center / physician if you feel unwell.
P321 Specific treatment (see supplemental instructions on the administration of antidotes on this label).
P330 Rinse mouth.
P332+P313 If skin irritation occurs: Get medical advice/attention.
P337+P313 If eye irritation persists: Get medical advice/attention.
P362+P364 Take off contaminated clothing and wash it before reuse.
P377 Leaking gas fire: Do not extinguish, unless leak can be stopped safely.
P381 In case of leakage, eliminate all ignition sources.

- Storage

P403 Store in a wellventilated place.
P403+P233 Store in a wellventilated place. Keep container tightly closed.
P405 Store locked up.

P410+P403 Protect from sunlight. Store in a wellventilated place.

- Disposal

P501 Discard the contents/containers in accordance with the laws and laws related to waste.

3) Other hazards:

According to experience and information provided, this product does not affect harmful effects when using and handling it as a regulation.

3. Composition/Information on ingredients

Chemical name	Common name	CAS No.	Content(wt%)
Ethylene oxide	ethylene oxide	75-21-8	100

4. First-aid measures

1) Following eye contact

- In case of contact with substance, immediately flush skin or eyes with running water for at least 20 minutes.
- Seek immediate medical assistance.

2) Following skin contact

- Contact with gas or liquefied gas may cause burns, severe injury and/or frostbite.
- For hot product, immediately immerse in or flush the affected area with large amounts of cold water to dissipate heat.
- For minor skin contact, avoid spreading material on unaffected skin.
- In case of burns, immediately cool affected skin for as long as possible with cold water. Do not remove clothing if adhering to skin.
- In case of contact with liquefied gas, thaw frosted parts with lukewarm water.
- In case of contact with substance, immediately flush skin or eyes with running water for at least 20 minutes.
- Remove and isolate contaminated clothing and shoes.
- Seek immediate medical assistance.

3) Following inhalation

- Administer oxygen if breathing is difficult.
- Do not use mouth-to-mouth method if victim ingested or inhaled the substance; give artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device.
- Give artificial respiration if victim is not breathing.
- If exposed to excessive levels of dusts or fumes, remove to fresh air and get medical attention if cough or other symptoms develop.
- Keep victim warm and quiet.
- Move to fresh air.
- Seek immediate medical assistance.

4) Following ingestion

- Do not use mouth-to-mouth method if victim ingested or inhaled the substance; give artificial respiration with

the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device.
- Seek immediate medical assistance.

5) Delayed and immediate effects and also chronic effects from short and long term exposure
- Causes serious eye irritation
- Causes skin irritation
- May cause cancer
- May cause genetic defects
- May cause respiratory irritation
- Toxic if inhaled
- Toxic if swallowed

6) Advice to physician
- Effects of contact or inhalation may be delayed.
- Ensure that medical personnel are aware of the material(s) involved and take precautions to protect themselves.
- Exposures require specialized first aid with contact and medical follow-up .
- Keep victim under observation.

5. Fire-Fighting measures

1) Suitable (and unsuitable) extinguishing media

○ Suitable extinguishing media
- CO2.
- Use alcohol foam, carbon dioxide, or water spray when fighting fires involving this material.
- Dry chemical.
- Use dry sand or earth to smother fire.
- Water spray.

○ Unsuitable extinguishing media
- Direct water.

2) Special hazards arising from the substance or mixture

○ Pyrolytic product
- Can decompose at high temperatures forming toxic gases.
- During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion.

○ Risk of fire and explosion
- Will form explosive mixtures with air.
- When heated, vapors may form explosive mixtures with air: indoors, outdoors and sewers explosion hazards.
- Vapors may travel to source of ignition and flash back.
- Will be easily ignited by heat, sparks or flames.
- Containers may explode when heated.
- Extremely flammable.
- Cylinders exposed to fire may vent and release flammable gas through pressure relief devices.
- May form explosive mixtures with air.
- May ignited from heat, friction or contamination.
- Runoff may create fire or explosion hazard.
- May violently polymerize and result in fire and explosion.

- Some may burn but none ignite readily.
- Some of these materials, if spilled, may evaporate leaving a flammable residue.

○ Other

- Fire may produce irritating, corrosive and/or toxic gases.
- Cylinders exposed to fire may vent and release flammable gas through pressure relief devices.
- May be fatal if inhaled or absorbed through skin.
- Vapors may cause dizziness or asphyxiation without warning.

3) Special protective equipment for firefighters

- Fire involving Tanks: Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank.
- Move containers from fire area if you can do it without risk.
- Rescuers should put on appropriate protective gear.
- Ruptured cylinders may rocket.
- Substance may be transported in a molten form.
- Use extinguishing agent suitable for type of surrounding fire.
- Vapors from liquefied gas are initially heavier than air and spread along ground.
- Damaged cylinders should be handled only by specialists.
- Dike fire-control water for later disposal; do not scatter the material.
- DO NOT EXTINGUISH A LEAKING GAS FIRE UNLESS LEAK CAN BE STOPPED.
- Evacuate area and fight fire from a safe distance.
- Fire involving Tanks: ALWAYS stay away from tanks engulfed in fire.
- Fire involving Tanks: Cool containers with flooding quantities of water until well after fire is out.
- Fire involving Tanks: Do not direct water at source of leak or safety devices; icing may occur.
- Fire involving Tanks: Fight fire from maximum distance or use unmanned hose holders or monitor nozzles.
- Fire involving Tanks: For massive fire, use unmanned hose holders or monitor nozzles; if this is impossible, withdraw from area and let fire burn.

6. Accident release measures

1) Personal precautions, protective equipment and emergency procedures

- If possible, turn leaking containers so that gas escapes rather than liquid.
- Isolate area until gas has dispersed.
- Isolate hazard area.
- Keep unnecessary and unprotected personnel from entering.
- Please note that materials and conditions to be avoided.
- Some of these materials, if spilled, may evaporate leaving a flammable residue.
- Stop leak if you can do it without risk.
- The very fine particles can cause a fire or explosion, eliminate all ignition sources.
- Use water spray to reduce vapors or divert vapor cloud drift. Avoid allowing water runoff to contact spilled material.
- Ventilate the contaminated area.
- All equipment used when handling the product must be grounded.
- Allow substance to evaporate.
- Clean up spills immediately, observing precautions in Protective Equipment section.
- Cover with plastic sheet to prevent spreading.
- Do not direct water at source of leak.

- Do not touch damaged containers or spilled material unless wearing appropriate protective clothing.
- Do not touch or walk through spilled material.
- ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area).
- Fully encapsulating, vapor protective clothing should be worn for spills and leaks with no fire.

2) Environmental precautions

- Prevent entry into waterways, sewers, basements or confined areas.
- Prevent spreading of vapors through sewers, ventilation systems and confined areas.
- Runoff may cause pollution.

3) Methods and materials for containment and cleaning up

- Absorb or cover with dry earth, sand or other non-combustible material and transfer to containers.
- Absorb spill with inert material (e.g., dry sand or earth), then place in a chemical waste container.
- Absorb the liquid and scrub the area with detergent and water.
- Dike and collect water used to fight fire.
- Reduce airborne dust and prevent scattering by moistening with water.

7. Handling and storage

1) Precautions for safe handling

- Use care in handling/storage.
- Use only in a well-ventilated area.
- All equipment used when handling the product must be grounded.
- Avoid breathing vapors from heated material.
- Avoid prolonged or repeated contact with skin.
- Do not enter storage area unless adequately ventilated.
- DO NOT PRESSURIZE, CUT, WELD, BRAZE, SOLDER, DRILL, GRIND, OR EXPOSE SUCH CONTAINERS TO HEAT, FLAME, SPARKS, STATIC ELECTRICITY, OR OTHER SOURCES OF IGNITION;.
- Follow all MSDS/label precautions even after container is emptied because they may retain product residues.
- Handling refer to engineering control/personal protection section.
- Loosen closure cautiously before opening.
- Please note that materials and conditions to be avoided.

2) Conditions for safe storage (including any incompatibilities)

- Containers can build up pressure if exposed to heat (fire).
- Empty drums should be completely drained, properly bunged, and promptly returned to a drum reconditioner, or properly disposed of.
- Keep away from food and drinking water.
- Store in a closed container.

8. Exposure controls & personal protection

1) Chemical exposure limits, Biological exposure standard

Components	ACGIH regulations	Biological limit values
Ethylene oxide	1 ppm TWA	No data available

2) Appropriate engineering controls

- Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower.
- If user operations generate dust, fume, or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.
- Use process enclosures, local exhaust ventilation, or other engineering controls to control airborne levels below recommended exposure limits.

3) Personal protective equipment

○ Respiratory protection

- If you have a direct contact or exposed to the material, wear the appropriate form of respiratory protection certified.

○ Eye protection

- If the work environment or activity involves dusty conditions, mists or aerosols, wear the appropriate goggles.

○ Hand protection

- Wear chemical safety gloves.

○ Skin protection

- Wear protective gloves/ protective clothing/ eye protection/ face protection/ hearing protection.

9. Physical and chemical information

Property name	Values	Source
Appearance		
Physical state	Gas	Note : Liquefied gas
Color	colourless	ECHA
Odor	Sweet smell; etheric smell;irritating	ECHA
Odor threshold	50 ppm	KISChem
pH	No data available	
Melting point/freezing point	-111 ℃	ECHA
Initial boiling point and boiling range(℃)	10.7 ℃	ECHA
Flash point(℃)	-55 ℃	KOSHA, AKRON
Evaporation rate	No data available	
Flammability(solid, gas)	Flammable gas	ECHA
Upper/lower flammability or explosive limits	Upper 100 %(V) Lower 3 %(V)	IPCS

Vapour pressure	1,456 hPa (20 ℃)	ECHA
Solubility(ies)	completely miscible with water	
Vapour density	1.5(Air = 1.0)	IPCS
Relative density	No data available	
n-octanol/water partition coefficient	logPow : 0.3	HSDB
Auto ignition temperature	429 ℃	ECHA
Decomposition temperature	Decomposition energy : 1,280.9 kJ/mol	HSDB
Viscosity(㎟/s, 40℃)	No data available	
Molecular weight(mass)	44.1 g/mol	HSDB
Density	0.88 g/㎤ (10℃)	ECHA
Specific gravity	0.9	

10. Stability and hazardous reactivity

1) Chemical stability and Possibility of hazardous reactions

- Runoff may create fire or explosion hazard.
- Some may burn but none ignite readily.
- Some of these materials may react violently with water.
- Vapors may cause dizziness or asphyxiation without warning.
- Vapors may travel to source of ignition and flash back.
- When heated, vapors may form explosive mixtures with air: indoors, outdoors and sewers explosion hazards.
- Will be easily ignited by heat, sparks or flames.
- Will form explosive mixtures with air.
- Can decompose at high temperatures forming toxic gases.
- Containers may explode when heated.
- Cylinders exposed to fire may vent and release flammable gas through pressure relief devices.
- Extremely flammable.
- Fire may produce irritating, corrosive and/or toxic gases.
- May be fatal if inhaled or absorbed through skin.
- May form explosive mixtures with air.
- May ignited from heat, friction or contamination.
- May violently polymerize and result in fire and explosion.

2) Conditions to avoid

- Heat, contamination.
- Heat.
- Ignition source(heat, spark, flame, etc.).

3) Incompatible materials

- Combustibles, reducing material.
- Water.

4) Hazardous decomposition products

- Corrosive/toxic fume.
- During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion.
- Irritating, corrosive and/or toxic gas.

11. Toxicological information

1) Information on the likely routes of exposure

○ Inhalation

- Can be absorbed in body by inhalation.

2) Delayed and immediate effects and also chronic effects from short and long term exposure

○ Acute toxicity

- Acute toxicity(Oral)
  - Ministry of Environment(Category 3 : 100mg/kg)
- Acute toxicity(Dermal)
  - No data available
- Acute toxicity(Inhalation:Gases)
  - Ministry of Environment(Category 3 : 700ppm)
- Acute toxicity(Inhalation:Vapours)
  - No data available
- Acute toxicity(Inhalation:Dust/mist)
  - No data available

○ Skin corrosion/irritation

- Ministry of Environment(Category 2)

○ Serious eye damage/eye irritation

- Ministry of Environment(Category 2)

○ Respiratory sensitization

- No data available

○ Skin sensitization

- No data available

○ Carcinogenicity

- Ministry of Environment(Category 1)

○ Germ cell mutagenicity

- Ministry of Environment(Category 1)

○ Reproductive toxicity

- At a dose that does the mother animals show a general toxicity targeting appears affected rat fetal caused developmental toxicity test results, the difference in fetal number and weight detected NOAEC = 0.18 mg / L

(OECD TG 414) 1-generation reproduction using the rat toxicity test (OECD TG415) results reproductive toxicity effects associated with the test material is not observed. NOAEC (F1 / P) 0.054 mg / L

○ Specific target organ toxicity single exposure

- Ministry of Environment(Category 3(Respiratory tract irritation))

○ Specific target organ toxicity repeated exposure

- 104 shares carcinogenicity using not considered as 10 weeks effect repeated inhalation toxicity test weight increase statistically significant between from 250 ppm group, testis, spleen weight decrease, it was observed histopathological effects caused by the test substance rats Using rats inhalation toxicity test results being a significant adverse impact on the biological test all concentrations observed (OECD TG 453)

○ Aspiration hazard

- Since gas N

12. Ecological information

1) Ecotoxicity

- Hazardous to the aquatic environment, short-term (acute)
  No data available
- Hazardous to the aquatic environment, long-term (chronic)
  No data available
- Fish
  LC50 84 ㎎ / ℓ 96 hr Pimephales promelas (EPA-660 / 3-75-009)
- Crustaceans
  LC50 212 ㎎ / ℓ 48 hr Daphnia magna (EPA-660 / 3-75-009)
- Aquatic algae
  EC50 240 ㎎ / ℓ 96 hr Selenastrum capricornutum

2) Persistence and degradability

- Degradability
  No data available
- Biodegradation
  107% (existing chemical safety check data)

3) Bioaccumulative potential

- n-octanol water partition coefficient
  -0.3
- Bioconcentration factor(BCF)
  No data available

4) Mobility in soil

4.7 Koc (SRC KOCWIN v2.00)

5) Other adverse effects

No data available

13. Disposal considerations

1) Disposal methods
   - Empty containers should be taken to an approved waste handling site for recycling or disposal.

2) Precautions (including disposal of contaminated container of package)
   - Dispose of in accordance with local regulations.
   - Send to a licensed waste management company.

14. Transport information

1) UN No. : 1040

2) Proper shipping name : ETHYLENE OXIDE, or ETHYLENE OXIDE WITH NITROGEN

3) Hazard class : 2.3

4) Packing group : not specified by regulation

5) Marine pollutant : No

6) Special precautions for user related to transport or transportation measures :

Emergency measures in case of fire : F-D

Emergency measures in the effluent : S-U

- ADR

· Tunnel restriction code : B/D

- IMDG

· Marine pollutant : No

- Air transport(IATA)

· UN No. : 1040

· Proper shipping name : ETHYLENE OXIDE, or ETHYLENE OXIDE WITH NITROGEN

· Class or division : 2.3

· Packing group : not specified by regulation

15. Regulatory information

Australia Industrial Chemicals Notification and Assessment Act

- Inventory - Australia - Inventory of Industrial Chemicals (AIIC)

  - Ethylene oxide : Present

China Inventory of Existing Chemical Substances (IECSC)

- Inventory - China - Inventory of Existing Chemical Substances (IECSC)

  - Ethylene oxide : Present [14915]

92/32/EEC

- Not applicable

European Union Official Journal of the European Communities 15 June 1990 - Annex Based on Article 13 of Directive 67/548/EEC Amended by Directive 79/831/EEC

- Inventory - European Union - European Inventory of Existing Commercial Chemical Substances (EINECS)

- Ethylene oxide : 200-849-9

Japan - ISHL Ordinance Hazardous Substances Whose Names Are to be Indicated on the Label

Japan Law Concerning the Examination and Regulations of Manufacture, etc. of Chemical Substances

- Inventory - Japan - Existing and New Chemical Substances (ENCS)

- Ethylene oxide : (2)-218

New Zealand Environmental Protection Authority, Inventory of Chemicals

- Inventory - New Zealand - Inventory of Chemicals (NZIoC)

- Ethylene oxide : HSNO Approval: HSR001059

Turkey Regulation on Inventory and Control of Chemicals

- Not applicable

Taiwan Chemical Substance Inventory

- Inventory - Taiwan - Taiwan Chemical Substance Inventory (TCSI)

- Ethylene oxide : Present

U.S. Toxic Substances Control Act

Vietnam National Chemicals Inventory (NCI)

- Inventory - Vietnam - National Chemicals Inventory (NCI) (DRAFT)

- Ethylene oxide : Present 00420

16. Other information

1) Reference

NCIS, KOSHA, Montreal Protocol, ECHA, OECD SIDS, EU IUCLID, HSDB(PubChem), NITE, NTP, ACGIH, IARC, NIOSH, ChemIDplus, EPA, EPI Suite, INCHEM

2) Issue date : 26-12-2022

3) Revision date

○ Revised date count : 3-1

○ Last revised date : 01-06-2026

4) Other

ACGIH : American Conference of Governmental Industrial Hygienists
ADR : Agreement Concerning the International Carriage of Dangerous Goods by Road
ATE : The Acute Toxicity Estimate
ECHA : European Chemicals Agency
EPA : United States Environmental Protection Agency
EPI Suite : The Estimation Programs Interface for Windows
EU IUCLID : International Uniform Chemical Information Database
HSDB : Hazardous Substances Data Bank
IARC : International Agency for Research on Cancer
IATA : International Air Transport Association
IMDG : International Maritime Dangerous Goods Codes
INCHEM : Internationally Peer Reviewed Chemical Safety Information
M-Factor : The Multiplication Factor
NIOSH : National Institute of Occupational Safety and Health
NITE : National Institute of Technology and Evaluation(JAPAN)
NTP : National Toxicology Program
SCL : Specific Concentration Limit
OECD SIDS : Organization for Economic Co-operation and Development Screening Information Dataset

GHS/EN