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SECTION 1. IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING

1.1. Product identifier

Product name: **Ethylene Oxide**

Substance name: Ethylene Oxide

EC No. : 200-849-9

REACH Registration No. :

CAS No. : 75-21-8

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

1.2.1. Relevant identified uses: Manufacturing ethylene glycol, Synthesis of ethanolamine and glycolether, surfactant

1.2.2. Uses advised against: Use for recommended use only

1.3. Details of the supplier of the safety data sheet

Manufacturer: Hanwha TotalEnergies Co.,Ltd

Address: 103, Dokgot 2-ro, Daesan-Up, Seosan, Chungnam, 31900, Korea

Telephone: +82-41-660-6391

1.4. Emergency telephone number

EU-wide emergency number: 112


See section 16.6 for the list of telephone number of National Helpdesks in the European Economic Area.

SECTION 2. HAZARD IDENTIFICATION

2.1. Classification of the substance/mixture

2.1.1. Classification according to Regulation (EC) No 1272/2008 [CLP]

- Flammable gases : Category1, H220
- Gases under pressure : Liquefied gas, H280
- Acute toxicity (oral) : Category3, H301
- Acute toxicity (inhalation: gas) : Category3, H331
- Skin corrosion/irritation : Category1, H314
- Serious eye damage/irritation : Category1, H318
- Germ cell mutagenicity : Category1B, H340
- Carcinogenicity : Category1B, H350
- Reproductive toxicity : Category1B, H360


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- Specific target organ toxicity(Single exposure) : Category3(Narcotic effects), H336
- Specific target organ toxicity(Single exposure) : Category3(Respiratory tract irritation), H335
- Specific target organ toxicity(Repeated exposure) : Category1, H372

2.2. Label elements

2.2.1. Labelling according to Regulation (EC) No 1272/2008 [CLP]

* Hazard Pictogram(s)



* Signal word: Danger

* Hazard statement(s)


- H220 Extremely flammable gas
- H280 Compressed gas ; Contains gas under pressure; may explode if heated
- H301 Toxic if swallowed
- H314 Causes severe skin burns and eye damage
- H318 Causes serious eye damage
- H331 Toxic if inhaled
- H335 May cause respiratory irritation.
- H336 May cause drowsiness and 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
(Refer Section SDS 11)

* Precautionary statement(s)

1) 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/sparks/open flames/hot surfaces. No smoking.
- P260 Do not breathe dust/fume/gas/mist/vapours/spray.
- P261 Avoid breathing dust/fume/gas/mist/vapours/spray.
- P264 Wash hands thoroughly after handling.
- P270 Do not eat, drink or smoke when using this product.
- P271 Use only outdoors or in a well-ventilated area.
- P280 Wear protective gloves/protective clothing/eye protection/face protection.

2) Response

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- P301+P310 IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician.
- P301+P330+P331 IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.
- P303+P361+P353 IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower.
- P304+P340 IF INHALED: Remove victim to fresh air and keep at rest in a position 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.
- P310 Immediately call a POISON CENTER or doctor/physician.
- P311 Call a POISON CENTER or doctor/physician.
- P312 Call a POISON CENTER or doctor/physician if you feel unwell.
- P314 Get medical advice/attention if you feel unwell.
- P321 Specific treatment
- P330 Rinse mouth.
- P363 Wash contaminated clothing before reuse.
- P377 Leaking gas fire: Do not extinguish, unless leak can be stopped safely.
- P381 Eliminate all ignition sources if safe to do so.

3) Storage

- P403 Store in a well-ventilated place.
- P403+P233 Store in a well-ventilated place. Keep container tightly closed.
- P405 Store locked up.
- P410+P403 Protect from sunlight. Store in a well-ventilated place.

4) Disposal

- P501 Dispose of contents/container in accordance with local/regional/national/international regulation

* Indication of danger


- Note U: When put on the market gases have to be classified as "Gases under pressure", in one of the groups compressed gas, liquefied gas, refrigerated liquefied gas or dissolved gas. The group depends on the physical state in which the gas is packaged and therefore has to be assigned case by case.

2.3 Other hazards

- Not available

SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

3.1. Substances

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Chemical Name	EC No.	CAS No.	REACH Registration No.	% [weight]	Classification [1272/2008/EC]
Ethylene Oxide	200-849-9	75-21-8		100	Press. Gas, H280 Flam. Gas, H220 Acute Tox. 3, H301 Acute Tox. 3, H331 Carc. 1B, H350 Muta. 1B, H340 Repr. 1B, H360Fd Eye Dam. 1, H318 Skin Corr. 1, H314 STOT SE 3, H335 STOT SE 3, H336 STOT RE 1, H372

3.2. Mixtures

- Not applicable

SECTION 4: FIRST AID MEASURES


4.1. Description of first aid measures

4.1.1. Eye contact

- Do not rub your eyes.
- Immediately flush eyes with plenty of water for at least 15 minutes and call a doctor/physician.
- Get medical attention immediately.
- Go to the hospital immediately if symptoms(flare, irritate) occur.
- Remove contact lenses if worn.

4.1.2. Skin contact

- Flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes.
- Wash contaminated clothing thoroughly before re-using.
- In case of contact with liquefied gas or frozen liquefied gas, dissolve the area with lukewarm water.
- Contact with liquefied gas or frozen liquefied gas may cause burns, serious injury, or frostbite. Get emergency medical attention.
- Get medical attention immediately.
- Go to the hospital immediately if symptoms(flare, irritate) occur.
- Remove contaminated clothing, shoes and isolate.

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- Wash thoroughly after handling.
- Wear gloves when washing the patient, and please avoid contact with contaminated clothing.

4.1.3. Inhalation contact

- When exposed to large amounts of steam and mist, move to fresh air.
- Take specific treatment if needed.
- Get medical attention immediately.
- If breathing is stopped or irregular, give artificial respiration and supply oxygen.

4.1.4. Ingestion contact

- Please be advised by doctor whether induction of vomit is demanded or not.
- Rinse your mouth with water immediately.
- Flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes.
- Get medical attention immediately.

4.2. Most important symptoms and effects, both acute and delayed

- Not available

4.3. Indication of any immediate medical attention and special treatment needed

- Notify medical personnel of contaminated situations and have them take appropriate protective measures.
- If exposed or concerned, get medical attention/advice.


SECTION 5: FIREFIGHTING MEASURES

5.1. Extinguishing media

- Suitable extinguishing media : Alcohol-resistant foam, water, powder extinguishing agent, carbon dioxide
- Unsuitable extinguishing media : Avoid use of water jet for extinguishing.
- In case of conflagration : Use alcohol-resistant foam or watering in large quantities with fine spray.
- In case of extinguishing the fire: Wear fire extinguishing clothing, fire rescue helmet, fire safety shoes, fire safety gloves, and air respirator.

5.2. Special hazards arising from the substance or mixture

- Extremely flammable gas
- May cause fire and explosion due to violent polymerization reaction.
- During burning, irritating and very toxic gases may be generated by pyrolysis or combustion.
- Container may explode when heated.
- May form explosive mixtures with air.

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- Leaked material has a risk of fire/explosion.
- Can be ignited by heat, sparks, flames.
- Steam can travel to the ignition source and flash back.
- Cylinders exposed to fire may release combustible gases.
- Vapors can cause dizziness or suffocation without awareness.
- May be fatal when inhaled and absorbed by the skin.
- Including high-pressure gas; May explode if heated.

5.3. Advice for firefighters

- Move containers from fire area, if you can do without the risk.
- Keep containers cool with water spray.
- Evacuate immediately if you hear the sound of operating safety devices or the tank is discolored due to a fire.
- Notify the fire department, and tell the fire location and hazardous features.
- In case of conflagration, use automatic fire sprinkler. Major fire may require withdrawal, allowing the object itself to burn.
- In case of leaky gas fire, do not try to extinguish the fire unless the leak can be stopped safely
- Eliminate all sources of ignition if necessary.

SECTION 6: ACCIDENTAL RELEASE MEASURES


6.1. Personal Precautions, protective equipment and emergency procedures

6.1.1. For non-emergency personnel

- Protective equipment: Wear proper protective equipment.
- Emergency procedures: Not applicable
- If required, notify relevant authorities according to all applicable regulations.

6.1.2. For emergency responders

- Wear proper personal protective apparatus as indicated in Section 8 and avoid skin contact and inhalation.
- Must work against the wind, let the upwind people to evacuate.
- Remove all sources of ignition.
- Avoid skin contact and inhalation.
- Cleanup and disposal under expert supervision is advised.
- Ventilate closed spaces before entering.
- Do not touch spilled material. Stop leak if you can do it without risk.
- Handle the damaged containers or spilled material after wearing appropriate protective equipment.
- Keep unauthorized people away, isolate hazard area and deny entry.

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6.2. Environmental precautions

- Prevent runoff and contact with waterways, drains or sewers.
- If large amounts have been spilled, inform the relevant authorities.
- Avoid dispersal of spilt material and runoff and contact with waterways, drains and sewers. If large spills, advise emergency services.

6.3. Methods and material for containment and cleaning up

6.3.1. For containment

- Clear spills immediately
- Clean up all spills immediately.
- Clear area of personnel and move up wind.

6.3.2. For cleaning up

- Large spill: Stay upwind and keep out of low areas. Dike for later disposal.
- Notify the central and local government if the emission reach the standard threshold.
- Disposal of waste shall be in compliance with the Wastes Control Act .
- Appropriate container for disposal of spilled material collected.
- Spilled material should be treated as a potential risk of waste collected.

6.3.3. Other information

- Slippery when spilt.

6.4. Reference to other sections


- See Section 7 for information on safe handling.
- See Section 8 for information on personal protection equipment.
- See Section 13 for information on disposal.

SECTION 7: HANDLING AND STORAGE

7.1. Precautions for safe handling

- Follow all MSDS and label precautions as product residue (vapour, liquid, solid) may remain even after the container is emptied.
- Handle only in a well-ventilated place.
- Do not handle until all safety precautions have been read and understood.
- Use work clothes and working shoes that can prevent static electricity.
- Unskilled persons should not handle this chemical product or its container.
- Avoid contact with heat, sparks, flames or other sources of ignition.
- No smoking
- Contaminated clothing should not be allowed out of the workplace.

7.2. Conditions for safe storage, including any incompatibilities

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- Check regularly for leaks.
- Do not use damaged containers.
- Do not apply heat directly.
- Do not apply physical shock to the container.
- Prevent static electricity and do not store it near heat sources such as boilers and inflammables.
- Collect in an airtight container.
- Store in a designated storage area for carcinogenic substances.
- Do not eat or smoke when handling.
- Store in a well-ventilated place.

7.3. Specific end use(s)

- See Section 1 for information on 1.2 Relevant identified uses.

SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1. Control parameters

8.1.1. Occupational exposure limits

European Union (EU) Commission Directive 2006/15/EC (IOELVs)

- Not available

European Union (EU) Commission Directive 2006/15/EC (IOELVs) - Skin

- Not available

Greece Occupational Exposure Limits

- [Oxirane] - Exposure Limit : 5 ppm ; Exposure Limit : 10 mg/m³

Netherlands Occupational Exposure Limits

- Not available

Denmark Indicative List of Organic Solvents

- Not available

Denmark List of Limit Values for Dust

- Not available

Latvia Occupational Exposure Limit Values (OELV) for Chemical Substances in the Work Environment AtmbExcel Air & Hydraulics9

- [Oxirane] - Occupational Exposure Limit Values (OELV) 8hr : 1 mg/m³

Latvia Carcinogens and their Occupational Exposure Limit Values (OELV)

- [Oxirane] - Limit Value (8-hours of exposure) : 1 mg/m³

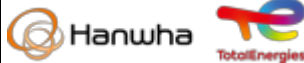
Bulgaria Occupational Exposure Limits

- [Oxirane] - Limit values 15 min : 2.0 mg/m³

Bulgaria Limit values for the chemical agents in the air at the working environment

- [Oxirane] - Limit Values 8 hours : 2.0 mg/m³

Sweden Occupational Exposure Limit Values

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- [Oxirane] - NGV : 1 ppm ; NGV : 2 mg/m³ ; KTV : 5 ppm ; KTV : 9 mg/m³
Sweden Occupational Exposure Limit Values and Measures against Air Contaminants

- [Oxirane] - LLV : 1 ppm ; LLV : 2 mg/m³ ; STV : 5 ppm ; STV : 9 mg/m³
Spain Changes Proposed for Occupational Exposure Limit Values

- Not available
Spain Occupational Exposure Limit for Chemical Agents

- [Oxirane] - VLA- ED : 1 ppm ; VLA- ED : 1.8 mg/m³
Slovak Republic Highest Admissible Exposure Limits

- Not available
Slovak Republic Highest Admissible Exposure Limits - Solid aerosols predominately with fibrogenic effect

- Not available
Slovak Republic Highest Admissible Exposure Limits - Solid aerosols with possible fibrogenic effect

- Not available
Slovak Republic Highest Admissible Exposure Limits - Solid aerosols predominately with nonspecific effect

- Not available
Ireland Occupational Exposure Limits

- [Oxirane] - Occupational Exposure Limit Value (8-hour reference period) : 5 ppm
Occupational Exposure Limit Value (8-hour reference period) : 10 mg/m³ (Ethylene oxide)

UK Workplace Exposure Limits (WELs)

- [Oxirane] - Long-term Exposure Limit : 5 ppm ; Long-term Exposure Limit : 9.2 mg/m³ (Ethylene oxide)

Austria Technical Exposure Limits (TRK Values)

- [Oxirane] - TMW : 1 ppm ; TMW : 2 mg/m³ ; KZW : 4 ppm ; KZW : 8 mg/m³ (Ethylenoxid)

Austria Occupational Exposure Limits - Maximum Workplace Concentrations (MAK)

- Not available
Italy Occupational Exposure Limits

- [Oxirane] - TWA : 1 ppm (Ethylene oxide)

Czech Republic Occupational Exposure Limits (PEL and NPK-P)


- [Oxirane] - PEL : 1 mg/m³ ; NPK-P : 3 mg/m³ (Ethylenoxid)

Czech Republic Occupational Exposure Limits - Dusts predominately with fibrogenic effect

- Not available
Czech Republic Occupational Exposure Limits - Dusts with possible fibrogenic effect

- Not available
Czech Republic Occupational Exposure Limits - Dusts predominately with nonspecific effect

- Not available

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Czech Republic Occupational Exposure Limits - Dusts predominately with irritating effect

- Not available

Czech Republic Occupational Exposure Limits - Mineral fibrous dusts

- Not available

Poland Workplace Maximum Allowable Concentration - Dust

- Not available

Poland Workplace Maximum Allowable Concentration

- [Oxirane] - NDS 8h/d - 40h/w : 1 mg/m³

France Threshold Limit Values for Occupational Exposure - VLE/VME

- [Oxirane] - VME : 1 ppm

Finland Occupational Exposure Levels - Concentrations Known to be Harmful

- [Oxirane] - HTP Value (8h) : 1 ppm ; HTP Value (8h) : 1.8 mg/m³

Hungary Occupational Exposure Limits

- Not available

8.1.2. Recommended Monitoring Procedures

- Personal, workplace atmosphere or biological monitoring may be required to determine the effectiveness of the ventilation or other control measures and/or the necessity to use respiratory protective equipment.

8.1.3. DNEL/PNEC – Values

- Not available

8.2. Exposure controls

8.2.1. Appropriate engineering controls

- Business owner is recommended to maintain below recommended exposure limits for the working place with general exhaust of gas/vapour/mist/fume.

8.2.2. Individual protection measures, such as personal protective equipment

1) Respiratory protection:

- Respiratory protection is ranked in order from minimum to maximum.
- Consider warning properties before use.
- Any chemical cartridge respirator with organic vapor cartridge(s).
- Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s).
- Any air-purifying respirator with a full facepiece and an organic vapor canister.
- For Unknown Concentration or Immediately Dangerous to Life or Health : Any supplied-air respirator with full facepiece and operated in a pressure-demand or other positive-pressure mode in combination with a separate escape supply. Any self-contained breathing apparatus with a full facepiece.
- Under conditions of frequent use or heavy exposure, Respiratory protection may be needed.

2) Eye protection



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- Wear primary eye protection such as splash resistant safety goggles with a secondary protection face shield.
- Provide an emergency eye wash station and quick drench shower in the immediate work area.

3) Hand protection

- Wear appropriate chemical resistant glove.

4) Skin protection

- Wear appropriate chemical resistant protective clothing.


8.2.3 Environmental exposure controls

- Do not let product enter drains. For ecological information refer to section 12.

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

9.1. Information on basic physical and chemical properties

Appearance(State)	Gas
Appearance(Color)	Colorless
Odor	Sweet
Odor threshold	50ppm
pH	Not available
Melting point/Freezing point	- 111°C
Initial boiling point and boiling range	11°C
Flash point	- 29°C
Evaporation rate	Not available
Flammability(solid, gas)	Flammable gas
Upper/Lower Flammability or explosive limits	100%/3%
Vapour pressure	1095 mmHg (20°C)
Vapour density	1.5 (air= 1)
Relative density	0.8824 (10°C)
Solubility	100g/100mℓ (25°C)
Partition coefficient of n-octanol/water	- 0.3
Autoignition temperature	429°C
Decomposition temperature	Not available
Viscosity	0.0095cPs(25°C)
Explosive properties	Not available
Oxidising properties	Not available

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9.2. Other information

- Not available

SECTION 10: STABILITY AND REACTIVITY

10.1. Reactivity

- Product is stable under normal ambient and anticipated storage and handling conditions of temperature and pressure.

10.2. Chemical Stability

- Stable under recommended storage and handling conditions.

10.3. Possibility of hazardous reactions

- May be explosively decomposed when heated above 427°C
- Polymerization reaction: May be polymerized violently or explosively
- May form explosive mixtures
- Including high-pressure gas; May explode if heated

10.4. Conditions to avoid

- Avoid contact with heat, flames, sparks and other sources of ignition.
- Containers may burst or explode if exposed to heat
- Cylinders exposed to fire may release combustible gases
- May cause fire by contact with other combustible materials.
- Avoid prohibiting mixing substances and conditions.
- Avoid contact with heat, sparks, flames or other sources of ignition.

10.5. Incompatible materials

- Acids, combustible substances, bases, metal salts, metal oxides, amines, halocarbon compounds, metals, cyanides, oxidizing agents


10.6. Hazardous decomposition products

- In case of pyrolysis, generates carbon oxides.

SECTION 11: TOXICOLOGICAL INFORMATION

11.1. Acute toxicity

- Oral: Category 3
- LD50 = 100 mg/kg Rat (ECHA)
- Dermal: Not available

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- Inhalation: Category 3
 - LC50 = Gas 660 ppm 4hr Rat (ECHA)

11.2. Skin corrosion/irritation: Category 1

- Severe injury to the skin was described as the result of contact, in particular with aqueous solutions of ethylene oxide. Test species :Rabbit (ECHA)

11.3. Serious eye damage/irritation: Category 1

- Eye damage/irritation test results in rabbits, pathological changes in the eyeball increase as the concentration of the substance increases (ECHA)

11.4. Respiratory sensitization: Not available

11.5. Skin sensitization: Not available

11.6. Carcinogenicity : Category 1B

- NTP: K
- IARC: Group 1
- ACGIH: A2
- OSHA: Not available
- EU CLP: 1B (In carcinogenicity: inhalation test, Rat, OECD Guideline 453)

11.7. Germ cell mutagenicity: Category 1B


- In vitro mammalian gene mutation test result, in vitro mammalian sister chromosome exchange test result, in vitro bacterial reverse mutation analysis test result (if there is no metabolic activation system), positive
- Using mice in vivo dominant lethal test result, positive (ECHA)

11.8. Reproductive toxicity: Category 1B

- Based on the criteria laid down in the aforementioned regulation the Committee for Risk Assessment (RAC) has proposed harmonising the classification and labelling at EU level to reproductive toxicant category 1B (H360Fd) (ECHA)
- Fetal development was affected at doses that did not show general toxicity to mother animals. As a result of developmental toxicity tests in rats, differences in the number and weight of fetuses were found. (NOAEC = 0.18 mg/L (OECD TG 414)).

11.9. STOT-single exposure: Category 3 (Respiratory irritation) (Narcotic effects)

- May cause drowsiness and dizziness.
- May cause respiratory irritation.

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- Results of acute inhalation toxicity test in rats, tachypnea and kidney disease occurred. (ECHA)

11.10. STOT-repeated exposure: Category 1

- In the case of ethylene oxide, there are animal data showing clear effects on peripheral nervous system. Exposure to 450 ppm of ethylene oxide for 8 to 13 days resulted in lesions in the mucosa of the nasal cavity, testicular degeneration, and thymic atrophy. Although there was no clear-cut pathogenic mechanism evident, the most probable cause of death was attributed to vascular damage as evidenced by gastrointestinal bleeding, urinary tract bleeding and/or pulmonary edema. In only the male rats of the 450 ppm group was testicular degeneration with abnormal spermatocytes and atrophy of the seminiferous tubules noted. (ECHA)

11.11 Aspiration hazard: Not classified

SECTION 12: ECOLOGICAL INFORMATION

12.1. Toxicity

- Acute aquatic toxicity: Not classified
- Chronic aquatic toxicity: Not classified

12.1.1. Fish

LC50 = 84 mg/L 96 hr Pimephales promelas (EPA-660/3-75-009) (ECHA)

12.1.2. Invertebrate

LC50 = 212 mg/L 48 hr Daphnia magna (EPA-660/3-75-009) (ECHA)

12.1.3. Algae

EC50 = 240 mg/L 96 hr Selenastrum capricornutum (ECHA)

12.2. Persistence and degradability

12.2.1. Persistence

- log Kow -0.3 (ICSC)

12.2.2. Degradability

- Not available

12.3. Bioaccumulative potential

12.3.1. Bioaccumulation


- 107 % (28 days, OECD TG 301C)

12.3.2. Degradability

- Not available

12.4. Mobility in soil

- 4.7 Koc (SRC KOCWIN v2.00) (ECHA)

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12.5. Results of PBT and vPvB assessment

- Not available

12.6. Other adverse effects

- Not available

SECTION 13: DISPOSAL CONSIDERATIONS

13.1. Waste treatment methods

- Stabilization and minimization treatment by incineration or similar method can be applied, if more than two kinds of designated wastes are in mixture state and it is impractical to separate them.
- Oil water separation technology shall be applied as pre-waste treatment if it is applicable.
- It shall be treated by incineration.
- Anyone with business license number who generates industrial wastes shall treat the waste by him/herself or by entrusting to the legal entities who treat the wastes, recycle the wastes of others or install and operate the waste treatment facilities according to the Wastes Control Act.
- Dispose of waste in accordance with all applicable laws and regulations.

SECTION 14: TRANSPORT INFORMATION

14.1. UN No.

14.1.1. UN No. (ADR/RID/ADN)

- 1040

14.1.2. UN No. (IMDG CODE/IATA DGR)

- 1040

14.1.3. UN No. (ICAO)

- 1040

14.2. UN proper shipping name

- ETHYLENE OXIDE OR ETHYLENE OXIDE WITH NITROGEN UP TO A TOTAL PRESSURE OF 1MPa (10 BAR) AT 50 DEGREES C

14.3. Transport hazard class(es)


14.3.1. ADR/RID/ADN Class

- 2

14.3.2. ADR/RID/ADN Class

- Class : 2, ETHYLENE OXIDE

14.3.3. ADR Label No.

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- 2.3 +2.1

14.3.4. IMDG Class

- 2.3

14.3.5. ICAO Class/Division

- 2.3

14.3.6. Transport Labels



14.4. Packing group

14.4.1. ADR/RID Packing group

- Not applicable

14.4.2. IMDG Packing group

- Not applicable

14.4.3. ICAO Packing group

- Not applicable

14.5. Environmental hazards

- Not applicable

14.6. Special precautions for user

- Local transport follows in accordance with Dangerous goods Safety Management Law.
- Package and transport follow in accordance with Department of Transportation (DOT) and other regulatory agency requirements.
- EmS FIRE SCHEDULE : F-D (Flammable gases)
- EmS SPILLAGE SCHEDULE : S-U (Gases (flammable, toxic or corrosive))
- Emergency Action Code : 2PE
- Hazard No.(ADR) : 263
- Tunnel Restriction Code : 1 (B/D)


14.7. Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code

- Not applicable

SECTION 15: REGULATORY INFORMATION

15.1. Safety, health and environmental regulation / legislation specific for the substance or mixture

15.1.1. Europe regulatory

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15.1.1.1. REACH Restricted substance under REACH
 - Applicable

15.1.1.2. REACH Substances subject to authorization under REACH
 - Not applicable

15.1.1.3. REACH SVHC
 - Not applicable

15.1.1.4. Europe PBT
 - Not applicable

15.1.1.5. European Union (EU) Transport of Dangerous Goods by Road - Dangerous Goods List
 - Not applicable


15.2. Chemical Safety Assessment
 - Not conducted

SECTION 16: OTHER INFORMATION

16.1. Indication of changes
 - The Safety Data Sheet has been reviewed and the data therein were revised and laid out according the requirements of the Commission Regulation (EC) No. 453/2010

16.2. Abbreviations and acronyms

- ☐ ACGIH(American Conference of Governmental Industrial Hygienists)
- ☐ ECHA(European Chemicals Agency)
- ☐ OECD(Organization for Economic Co-operation and Development)
- ☐ CERCLA(Comprehensive Environmental Response, Compensation, and Liability Act)
- ☐ IARC(International Agency for Research on Cancer)
- ☐ OSHA(Occupational Safety and Health Administration)
- ☐ NTP(National Toxicology Program)
- ☐ TSCA(Toxic Substances Control Act)
- ☐ LC₅₀(Lethal Concentration 50% kill)
- ☐ LD₅₀(Lethal Dose 50% kill)
- ☐ EC₅₀(50% Effect Concentration)
- ☐ STEL(Short Term Exposure Limit)
- ☐ TWA(Time weight Average)
- ☐ TLV(Threshold Limit Value)
- ☐ 1272/2008 CLP: Classification, Labelling and Packaging regulation.
- ☐ REACH: Registration, Evaluation and authorisation of chemical substances.
- ☐ DNEL: Derive no effects level
- ☐ PNEC: Predicted no effect concentration

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16.3. Key literature references and sources for data

- TSCA; http://iaspub.epa.gov/sor_internet/registry/substreg/searchandretrieve/searchbylist/search.do
- EU Regulation 1272/2008
- UN Recommendations on the transport of dangerous goods 17th
- IARC Monographs on the Evaluation of Carcinogenic Risks to Humans; <http://monographs.iarc.fr>
- ECHA CHEM; <http://echa.europa.eu/web/guest/information-on-chemicals/registered-substances>
- OECD SIDS; <http://webnet.oecd.org/Hpv/UI/Search.aspx>
- EPA; <http://www.epa.gov/iris>
- This Safety Data Sheet was compiled with data and information from the following sources: RTECS, ECOSAR, HSDB, SIDS SIAP, ChemWATCH, CESAR, Chemical DB

16.4. Classification procedure



- The mixture classification has been derived based on the classification of the individual components in accordance with the rules set out in Regulation (EC) No 1272/2008 (CLP) as well as the translation tables in Annex VII to the same regulation.

16.5. Training advice

- Not applicable

16.6. Further information

- This SDS is prepared according to the Globally Harmonized System (GHS).
- This safety data sheet is based on current knowledge and information that we know.
- Please note that this information is not a guarantee of the product itself.
- The (M)SDS is a Hazard Communication tool and should be used to assist in the Risk Assessment. Many factors determine whether the reported Hazards are Risks in the workplace or other settings. Risks may be determined by reference to Exposures Scenarios. Scale of use, frequency of use and current or available engineering controls must be considered.
- This information is based on our current knowledge and is intended to describe the product for the purposes of health, safety and environmental requirements only.
- It should not therefore be construed as guaranteeing any specific property of the product.
- Contact National Helpdesks, List of Telephone Numbers :AUSTRIA (Vienna Wien) +43 1 515 61 0, BELGIUM (Brussels Bruxelles) +32 070 245 245, BULGARIA (Sofia) +359 2 9888 205, Croatia +385 1 2348 342 CZECH REPUBLIC (Prague Praha) +420 224 919 293 or

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