

Safety Data Sheet

according to Regulation (EC) No. 1907/2006 (REACH) with its amendment Regulation (EU) 2015/830

Ethylene oxide

Reference number: 056

Revision date: 12/11/2021 Supersedes version of: 24/11/2017 Issue date: 12/11/2021 Version: 4.0

Danger



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

1.1. Product identifier

Trade name : Ethylene oxide
 SDS no : 056
 Chemical description : Ethylene oxide
 CAS-No. : 75-21-8
 EC-No. : 200-849-9
 EC Index-No. : 603-023-00-X
 REACH registration No : 01-2119432402-53-XXXX
 Chemical formula : C₂H₄O

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

Relevant identified uses : Industrial and professional uses. Perform risk assessment prior to use.
 Test gas/Calibration gas.
 Chemical reaction / Synthesis.
 Laboratory use.
 Contact supplier for more information on uses.
 Uses advised against : Consumer use.

1.3. Details of the supplier of the safety data sheet

Company identification : SOL SpA
 Via G. Borgazzi 27
 20900 MONZA - Italia
 T +39 039 23.96.1
<http://www.sol.it>
 msds@sol.it
 E-Mail address (competent person) : msds@sol.it

1.4. Emergency telephone number

Emergency telephone number : Linea verde SET - 800452661 (24h/24h, 365 giorni l'anno); Dall'estero +39 0283421263

SECTION 2: Hazards identification


2.1. Classification of the substance or mixture

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

Physical hazards	Flammable gases, Category 1A	H220
	Chemically Unstable gases, Category A	H230
	Gases under pressure : Liquefied gas	H280
Health hazards	Acute toxicity (inhalation:gas) Category 3	H331
	Skin corrosion/irritation, Category 2	H315
	Serious eye damage/eye irritation, Category 2	H319
	Germ cell mutagenicity, Category 1B	H340
	Carcinogenicity, Category 1B	H350
	Specific target organ toxicity — Single exposure, Category 3, Respiratory tract irritation	H335
	Specific target organ toxicity — Repeated exposure, Category 1	H372

2.2. Label elements

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

Hazard pictograms (CLP)	:	   
		GHS02 GHS04 GHS06 GHS08
Signal word (CLP)	:	Danger
Hazard statements (CLP)	:	H220 - Extremely flammable gas. H280 - Contains gas under pressure; may explode if heated. 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. H372 - Causes damage to organs through prolonged or repeated exposure. H230 - May react explosively even in the absence of air.
Precautionary statements (CLP)	:	
- Prevention	:	P202 - Do not handle until all safety precautions have been read and understood. P260 - Do not breathe gas, vapours. P280 - Wear protective gloves, protective clothing, eye protection, face protection. P210 - Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
- Response	:	P308+P313 - IF exposed or concerned: Get medical advice. P332+P313 - If skin irritation occurs: Get medical advice/attention. P304+P340+P315 - IF INHALED : Remove victim to fresh air and keep at rest in a position comfortable for breathing. Get immediate medical advice / attention. P305+P351+P338+P315 - IF IN EYES : Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Get immediate medical advice / attention. P377 - Leaking gas fire: Do not extinguish, unless leak can be stopped safely. P381 - Eliminate all ignition sources if safe to do so. P302+P352 - IF ON SKIN: Wash with plenty of soap and water.
- Storage	:	P405 - Store locked up. P403 - Store in a well-ventilated place.
Supplemental information	:	Restricted to professional users.

2.3. Other hazards

None.

SECTION 3: Composition/information on ingredients

3.1. Substances

Name	Product identifier	%	Classification according to Regulation (EC) No. 1272/2008 [CLP]
Ethylene oxide	CAS-No.: 75-21-8 EC-No.: 200-849-9 EC Index-No.: 603-023-00-X REACH registration No: 01-2119432402-53	100	Flam. Gas 1A, H220 Chem. Unst. Gas A, H230 Press. Gas (Liq.), H280 Acute Tox. 3 (Inhalation:gas), H331 Skin Irrit. 2, H315 Eye Irrit. 2, H319 Muta. 1B, H340 Carc. 1B, H350 STOT SE 3, H335 STOT RE 1, H372

Contains no other components or impurities which will influence the classification of the product.

3.2. Mixtures

Not applicable

SECTION 4: First aid measures

4.1. Description of first aid measures

- Inhalation : Remove victim to uncontaminated area wearing self contained breathing apparatus. Keep victim warm and rested. Call a doctor. Perform cardiopulmonary resuscitation if breathing stopped.
- Skin contact : Remove contaminated clothing. Drench affected area with water for at least 15 minutes.
- Eye contact : Immediately flush eyes thoroughly with water for at least 15 minutes.
- Ingestion : Ingestion is not considered a potential route of exposure.

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

May cause irritation to cornea (with temporary disturbance to vision).
 May cause irritation to skin.
 May cause irritation to the respiratory tract, sneezing, coughing, burning sensation of throat with constricting sensation of the larynx and difficulty in breathing.
 See section 11.

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

Obtain medical assistance.

SECTION 5: Firefighting measures

5.1. Extinguishing media

- Suitable extinguishing media : Water spray or fog.
Dry powder.
- Unsuitable extinguishing media : Carbon dioxide.
Do not use water jet to extinguish.

5.2. Special hazards arising from the substance or mixture

- Specific hazards : Exposure to fire may cause containers to rupture/explode.
- Hazardous combustion products : Carbon monoxide.

5.3. Advice for firefighters

- Specific methods : Use fire control measures appropriate for the surrounding fire. Exposure to fire and heat radiation may cause gas receptacles to rupture. Cool endangered receptacles with water spray jet from a protected position. Prevent water used in emergency cases from entering sewers and drainage systems.
If possible, stop flow of product.
Use water spray or fog to knock down fire fumes if possible.
Do not extinguish a leaking gas flame unless absolutely necessary. Spontaneous/explosive re-ignition may occur. Extinguish any other fire.
Continue water spray from protected position until container stays cool.
Move containers away from the fire area if this can be done without risk.
- Special protective equipment for fire fighters : Wear gas tight chemically protective clothing in combination with self contained breathing apparatus.
Standard EN 943-2: Protective clothing against liquid and gaseous chemicals, aerosols and solid particles. Gas-tight chemical protective suits for emergency teams.
Standard EN 137 - Self-contained open-circuit compressed air breathing apparatus with full face mask.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

Try to stop release.
Evacuate area.
Monitor concentration of released product.
Consider the risk of potentially explosive atmospheres.
Wear self-contained breathing apparatus when entering area unless atmosphere is proved to be safe.
Eliminate ignition sources.
Ensure adequate air ventilation.
Prevent from entering sewers, basements and workpits, or any place where its accumulation can be dangerous.
Act in accordance with local emergency plan.
Stay upwind.

6.2. Environmental precautions

Try to stop release.
Reduce vapour with fog or fine water spray.

6.3. Methods and material for containment and cleaning up

Hose down area with water.
Ventilate area.
Wash contaminated equipment or sites of leaks with copious quantities of water.

6.4. Reference to other sections

See also sections 8 and 13.

SECTION 7: Handling and storage

7.1. Precautions for safe handling

Safe use of the product

: The product must be handled in accordance with good industrial hygiene and safety procedures.
Only experienced and properly instructed persons should handle gases under pressure.
Consider pressure relief device(s) in gas installations.
Ensure the complete gas system was (or is regularly) checked for leaks before use.
Do not smoke while handling product.
Avoid exposure, obtain special instructions before use.
Use only properly specified equipment which is suitable for this product, its supply pressure and temperature. Contact your gas supplier if in doubt.
Installation of a cross purge assembly between the container and the regulator is recommended.
Avoid suck back of water, acid and alkalis.
Assess the risk of potentially explosive atmospheres and the need for explosion-proof equipment.
Purge air from system before introducing gas.
Take precautionary measures against static discharge.
Keep away from ignition sources (including static discharges).
Consider the use of only non-sparking tools.
Do not breathe gas.
Avoid release of product into work area.
Ensure equipment is adequately earthed.

Safe handling of the gas receptacle

: Refer to supplier's container handling instructions.
 Do not allow backfeed into the container.
 Protect containers from physical damage; do not drag, roll, slide or drop.
 When moving cylinders, even for short distances, use a cart (trolley, hand truck, etc.) designed to transport cylinders.
 Leave valve protection caps in place until the container has been secured against either a wall or bench or placed in a container stand and is ready for use.
 If user experiences any difficulty operating valve discontinue use and contact supplier.
 Never attempt to repair or modify container valves or safety relief devices.
 Damaged valves should be reported immediately to the supplier.
 Keep container valve outlets clean and free from contaminants particularly oil and water.
 Replace valve outlet caps or plugs and container caps where supplied as soon as container is disconnected from equipment.
 Close container valve after each use and when empty, even if still connected to equipment.
 Never attempt to transfer gases from one cylinder/container to another.
 Never use direct flame or electrical heating devices to raise the pressure of a container.
 Do not remove or deface labels provided by the supplier for the identification of the content of the container.
 Suck back of water into the container must be prevented.
 Open valve slowly to avoid pressure shock.

7.2. Conditions for safe storage, including any incompatibilities

Observe all regulations and local requirements regarding storage of containers.
 Containers should not be stored in conditions likely to encourage corrosion.
 Container valve guards or caps should be in place.
 Containers should be stored in the vertical position and properly secured to prevent them from falling over.
 Stored containers should be periodically checked for general condition and leakage.
 Keep container below 50°C in a well ventilated place.
 Store containers in location free from fire risk and away from sources of heat and ignition.
 Keep away from combustible materials.
 Segregate from oxidant gases and other oxidants in store.
 All electrical equipment in the storage areas should be compatible with the risk of a potentially explosive atmosphere.

7.3. Specific end use(s)

None.

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

Ethylene oxide (75-21-8)	
EU - Indicative Occupational Exposure Limit (IOEL)	
Local name	Ethylene oxide
Remark	Skin. (Year of adoption 2012)
Regulatory reference	SCOEL Recommendations

Ethylene oxide (75-21-8)	
DNEL: Derived no effect level (Workers)	
Acute - systemic effects, inhalation	10 mg/m ³
Long-term - systemic effects, inhalation	2 mg/m ³ (DMEL)

Ethylene oxide (75-21-8)

PNEC: Predicted no effect concentration

Aqua (freshwater)	0.084 mg/l
Aqua (marine water)	0.0084 mg/l
Sediment, freshwater	0.178 mg/kg dwt
Sediment, marine water	0.0178 mg/kg dwt
Soil, agricultural	0.0136 mg/kg dwt
Micro-organisms in sewage treatment plant (STP)	13 mg/l

8.2. Exposure controls

8.2.1. Appropriate engineering controls

Product to be handled in a closed system and under strictly controlled conditions.
 Provide adequate general and local exhaust ventilation.
 Preferably use permanent leak-tight installations (e.g. welded pipes).
 Systems under pressure should be regularly checked for leakages.
 Ensure exposure is below occupational exposure limits (where available).
 Gas detectors should be used when toxic gases may be released.
 Consider the use of a work permit system e.g. for maintenance activities.

8.2.2. Individual protection measures, e.g. personal protective equipment

A risk assessment should be conducted and documented in each work area to assess the risks related to the use of the product and to select the PPE that matches the relevant risk.
 The following recommendations should be considered:

PPE compliant to the recommended EN/ISO standards should be selected.

• Eye/face protection

- : Wear goggles and a face shield when transfilling or breaking transfer connections.
 Standard EN 166 - Personal eye-protection - specifications.
 Provide readily accessible eye wash stations and safety showers.

• Skin protection

- Hand protection

- : Wear working gloves when handling gas containers.
 Standard EN 388 - Protective gloves against mechanical risk.
 Wear chemically resistant protective gloves.
 Standard EN 374 - Protective gloves against chemicals.
 Permeation time: minimum >480min long term exposure: material / thickness [mm] Butyl rubber (IIR) 0.7.
 Consult glove manufacturer's product information on material suitability and material thickness.
 The breakthrough time of the selected gloves must be greater than the intended use period.
- : Consider the use of flame resistant anti-static safety clothing.
 Standard EN ISO 14116 - Limited flame spread materials.
 Standard EN 1149-5 - Protective clothing: Electrostatic properties.
 Keep suitable chemically resistant protective clothing readily available for emergency use.
 Standard EN943-1 - Full protective suits against liquid, solid and gaseous chemicals.
 Wear safety shoes while handling containers.
 Standard EN ISO 20345 - Personal protective equipment - Safety footwear.

- Other

- Respiratory protection
 - : Gas filters may be used if all surrounding conditions e.g. type and concentration of the contaminant(s) and duration of use are known.
 - Use gas filters with full face mask, where exposure limits may be exceeded for a short-term period, e.g. connecting or disconnecting containers.
 - Standard EN 137 - Self-contained open-circuit compressed air breathing apparatus with full face mask.
 - Recommended: Filter AX (brown).
 - Gas filters do not protect against oxygen deficiency.
 - Standard EN 14387 - Gas filter(s), combined filter(s) and standard EN136, full face masks .
 - Keep self contained breathing apparatus readily available for emergency use.
 - Self contained breathing apparatus is recommended, where unknown exposure may be expected, e.g. during maintenance activities on installation systems.
- Thermal hazards
 - : None in addition to the above sections.

8.2.3. Environmental exposure controls

Refer to local regulations for restriction of emissions to the atmosphere. See section 13 for specific methods for waste gas treatment.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

Appearance	
- Physical state at 20°C / 101.3kPa	: Gas
- Colour	: Colourless.
Odour	: Ethereal. Poor warning properties at low concentrations.
Odour threshold	: Odour threshold is subjective and inadequate to warn of overexposure.
pH	: Not applicable for gases and gas mixtures.
Melting point / Freezing point	: -112 °C
Boiling point	: 10.4 °C
Flash point	: Not applicable for gases and gas mixtures.
Evaporation rate	: Not applicable for gases and gas mixtures.
Flammability (solid, gas)	: Extremely flammable gas.
Explosive limits	: 2.6 – 100 vol %
Vapour pressure [20°C]	: 1.4 bar(a)
Vapour pressure [50°C]	: 3.9 bar(a)
Vapour density	: Not applicable.
Relative density, liquid (water=1)	: 0.89
Relative density, gas (air=1)	: 1.5
Water solubility	: No reliable data available.
Partition coefficient n-octanol/water (Log Kow)	: -0.3
Auto-ignition temperature	: 435 °C
Decomposition temperature	: Not applicable.
Viscosity	: No reliable data available.
Explosive properties	: Not applicable.
Oxidising properties	: Not applicable.

9.2. Other information

Molar mass	: 44 g/mol
Critical temperature [°C]	: 196 °C
Other data	: Gas/vapour heavier than air. May accumulate in confined spaces, particularly at or below ground level.

SECTION 10: Stability and reactivity

10.1. Reactivity

No reactivity hazard other than the effects described in sub-sections below.

10.2. Chemical stability

Containers are commonly pressurised to 5-7 bars with nitrogen.
 May polymerise.
 May react explosively even in the absence of air.

10.3. Possibility of hazardous reactions

Can form explosive mixture with air.
May react violently with oxidants.

10.4. Conditions to avoid

Keep away from heat/sparks/open flames/hot surfaces. – No smoking.
May decompose violently at high temperature and/or pressure or in the presence of a catalyst.
Avoid moisture in installation systems.

10.5. Incompatible materials

Air, Oxidisers.
For additional information on compatibility refer to ISO 11114.

10.6. Hazardous decomposition products

Under normal conditions of storage and use, hazardous decomposition products should not be produced.

SECTION 11: Toxicological information

11.1. Information on toxicological effects

Acute toxicity : Toxic if inhaled.

LC50 Inhalation - Rat [ppm]	1450 ppm/4h
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Skin corrosion/irritation	: Causes skin irritation.
Serious eye damage/irritation	: Causes serious eye irritation.
Respiratory or skin sensitisation	: No known effects from this product.
Germ cell mutagenicity	: May cause genetic defects.
Carcinogenicity	: May cause cancer.
Toxic for reproduction : Fertility	: No known effects from this product.
Toxic for reproduction : unborn child	: No known effects from this product.
STOT-single exposure	: May cause respiratory irritation. May cause irritation to the respiratory tract. Damage to red blood cells (haemolytic poison).
STOT-repeated exposure	: Causes damage to organs through prolonged or repeated exposure. Damage to red blood cells (haemolytic poison).
Target organ(s)	: nervous system.
Aspiration hazard	: Not applicable for gases and gas mixtures.

SECTION 12: Ecological information

12.1. Toxicity

Assessment	: Classification criteria are not met.
EC50 48h - Daphnia magna [mg/l]	: 137 - 300 mg/l
EC50 72h - Algae [mg/l]	: 240 mg/l
LC50 96 h - Fish [mg/l]	: 84 mg/l

12.2. Persistence and degradability

Assessment	: The substance is readily biodegradable. Unlikely to persist.
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12.3. Bioaccumulative potential

Assessment	: Not expected to bioaccumulate due to the low log Kow (log Kow < 4). See section 9.
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12.4. Mobility in soil

Assessment	: Because of its high volatility, the product is unlikely to cause ground or water pollution. Partition into soil is unlikely.
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12.5. Results of PBT and vPvB assessment

Assessment : Not classified as PBT or vPvB.

12.6. Other adverse effects

Other adverse effects : May cause pH changes in aqueous ecological systems.
 Effect on the ozone layer : None.
 Effect on global warming : No known effects from this product.

SECTION 13: Disposal considerations

13.1. Waste treatment methods

Contact supplier if guidance is required.
 Do not discharge into areas where there is a risk of forming an explosive mixture with air.
 Waste gas should be flared through a suitable burner with flash back arrestor.
 Must not be discharged to atmosphere.
 Ensure that the emission levels from local regulations or operating permits are not exceeded.
 Refer to the EIGA code of practice Doc.30 "Disposal of Gases", downloadable at <http://www.eiga.org> for more guidance on suitable disposal methods.
 Return unused product in original container to supplier.
 List of hazardous waste codes (from Commission Decision 2000/532/EC as amended) : 16 05 04 *: Gases in pressure containers (including halons) containing hazardous substances.

13.2. Additional information

External treatment and disposal of waste should comply with applicable local and/or national regulations.

SECTION 14: Transport information

14.1. UN number

In accordance with ADR / RID / IMDG / IATA / ADN
 UN-No. : 1040

14.2. UN proper shipping name

Transport by road/rail (ADR/RID) : ETHYLENE OXIDE
 Transport by air (ICAO-TI / IATA-DGR) : Ethylene oxide
 Transport by sea (IMDG) : ETHYLENE OXIDE

14.3. Transport hazard class(es)

Labelling



2.3 : Toxic gases.
 2.1 : Flammable gases.

Transport by road/rail (ADR/RID)

Class : 2
 Classification code : 2TF
 Hazard identification number : 263
 Tunnel Restriction : B/D - Tank carriage : Passage forbidden through tunnels of category B, C, D and E. Other carriage : Passage forbidden through tunnels of category D and E

Transport by air (ICAO-TI / IATA-DGR)

Class / Div. (Sub. risk(s)) : 2.1

Transport by sea (IMDG)

Class / Div. (Sub. risk(s)) : 2.3 (2.1)
 Emergency Schedule (EmS) - Fire : F-D
 Emergency Schedule (EmS) - Spillage : S-U

14.4. Packing group

Transport by road/rail (ADR/RID)	: Not applicable
Transport by air (ICAO-TI / IATA-DGR)	: Not applicable
Transport by sea (IMDG)	: Not applicable

14.5. Environmental hazards

Transport by road/rail (ADR/RID)	: None.
Transport by air (ICAO-TI / IATA-DGR)	: None.
Transport by sea (IMDG)	: None.

14.6. Special precautions for user

Packing Instruction(s)

Transport by road/rail (ADR/RID) : P200

Transport by air (ICAO-TI / IATA-DGR)

Passenger and Cargo Aircraft : Forbidden.

Cargo Aircraft only : Forbidden.

Transport by sea (IMDG) : P200

Special transport precautions

- : Avoid transport on vehicles where the load space is not separated from the driver's compartment.
- Ensure vehicle driver is aware of the potential hazards of the load and knows what to do in the event of an accident or an emergency.
- Before transporting product containers:
 - Ensure there is adequate ventilation.
 - Ensure that containers are firmly secured.
 - Ensure valve is closed and not leaking.
 - Ensure valve outlet cap nut or plug (where provided) is correctly fitted.
 - Ensure valve protection device (where provided) is correctly fitted.

14.7. Transport in bulk according to Annex II of Marpol and the IBC Code

Not applicable.

SECTION 15: Regulatory information

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

EU-Regulations

Restrictions on use	: Restricted to professional users (Annex XVII REACH).
Other information, restriction and prohibition regulations	: Ensure all national/local regulations are observed.
Seveso Directive : 2012/18/EU (Seveso III)	: Listed.

National regulations

No additional information available

15.2. Chemical safety assessment

A CSA has been carried out.

SECTION 16: Other information

Indication of changes	: Revised safety data sheet in accordance with commission regulation (EU) No 2015/830.
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Abbreviations and acronyms

: ATE - Acute Toxicity Estimate
CLP - Classification Labelling Packaging Regulation; Regulation (EC) No 1272/2008
REACH - Registration, Evaluation, Authorisation and Restriction of Chemicals Regulation (EC) No 1907/2006
EINECS - European Inventory of Existing Commercial Chemical Substances
CAS# - Chemical Abstract Service number
PPE - Personal Protection Equipment
LC50 - Lethal Concentration to 50 % of a test population
RMM - Risk Management Measures
PBT - Persistent, Bioaccumulative and Toxic
vPvB - Very Persistent and Very Bioaccumulative
STOT- SE : Specific Target Organ Toxicity - Single Exposure
CSA - Chemical Safety Assessment
EN - European Standard
UN - United Nations
ADR - European Agreement concerning the International Carriage of Dangerous Goods by Road
IATA - International Air Transport Association
IMDG code - International Maritime Dangerous Goods
RID - Regulations concerning the International Carriage of Dangerous Goods by Rail
WGK - Water Hazard Class
STOT - RE : Specific Target Organ Toxicity - Repeated Exposure

Training advice

: Ensure operators understand the flammability hazard.
Users of breathing apparatus must be trained.
Ensure operators understand the toxicity hazard.

DISCLAIMER OF LIABILITY

: Before using this product in any new process or experiment, a thorough material compatibility and safety study should be carried out.
Details given in this document are believed to be correct at the time of going to press.
Whilst proper care has been taken in the preparation of this document, no liability for injury or damage resulting from its use can be accepted.

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