



MATERIALS SAFETY DATA SHEET (MSDS) Ethylene oxide (C₂H₄O)	MSDS Number:	
	Version number:	
	Date issued:	
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1. Product Identification

Product Name	Ethylene Oxide
Other means of identification	oxirane; Oxirane (ethylene oxide); 1,2-Epoxy ethane; Dimethylene oxide; epoxyethane; Ethylene oxide (I,T); Oxirane (I,T); ETHYLENE OXIDE--NLFG; Ethylene oxide (ISO); Anproline; Amprolene.
CAS No	75-21-8
Product use	Synthetic/Analytical chemistry.

Manufacturer/Importer/Supplier/Distributor information

Manufacturer Supplier	
E-Mail	Entity 1 Made by India
Contact Person	
Emergency Telephone	

2. Hazard(s) identification

OSHA/HCS status	This material is considered hazardous by the OSHA Hazard Communication Standard.
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Classification of the substance or mixture:



Flammable Gases	Category 1
Gases Under Pressure	Liquefied gas
Acute Toxicity (inhalation)	Category 3
Skin Irritation	Category 2
Eye Irritation	Category 2A
Germ Cell Mutagenicity	Category 1
Carcinogenicity	Category 1
Specific Target Organ Toxicity (Single Exposure) (Respiratory tract irritation)	Category 3

GHS label elements	
Hazard pictograms	
Signal word	Danger
Hazard statements	Extremely flammable gas. May form explosive mixtures with air. Contains gas under pressure; may explode if heated. May cause frostbite. Toxic if inhaled. Causes serious eye irritation. Causes skin irritation. May cause genetic defects. May cause cancer. May cause respiratory irritation. May cause frostbite. May form explosive mixtures with air.
Precautionary statements	
General	Read and follow all Safety Data Sheets (SDS'S) before use. Read label before use. Keep out of reach of children. If medical advice is needed, have product container or label at hand. Close valve after each use and when empty. Use equipment rated for cylinder pressure. Do not open valve until connected to equipment prepared for use. Use a back flow preventative device in the piping. Use only equipment of compatible materials of construction. Always keep container in upright position. Approach suspected leak area with caution.



Prevention	Obtain special instructions before use. Wear protective gloves. Wear protective clothing. Wear eye or face protection. Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. Use only outdoors or in a well ventilated area. Avoid breathing gas. Wash thoroughly after handling.
Response	Leaking gas fire: Do not extinguish, unless leak can be stopped safely. In case of leakage, eliminate all ignition sources. IF exposed or concerned: Get medical advice or attention. IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER or doctor. Take off contaminated clothing and wash it before reuse. IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical advice or attention.
Storage	Store locked up. Store in a well-ventilated place. Keep container tightly closed. Protect from sunlight.
Disposal	Dispose of contents and container in accordance with all local, regional, national and international regulations.
Hazards not otherwise classified	Liquid can cause burns similar to frostbite.

3. Composition and ingredient information

Chemical name	CAS number	%
Ethylene Oxide	75-21-8	34.38

4. 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.



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.
Indication of any immediate medical attention and special treatment needed	Obtain medical assistance.

5. Fire-fighting measures

Extinguishing media	
Suitable extinguishing media	Water spray or fog. Dry powder.
Unsuitable extinguishing media	Carbon dioxide. Do not use water jet to extinguish.
Special hazards arising from the substance or mixture	
Specific hazards	Exposure to fire may cause containers to rupture/explode.
Hazardous combustion products	Carbon monoxide.

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 reignition 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 fullface mask.



6. Accidental Release Measures

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 work pits, or any place where its accumulation can be dangerous. Act in accordance with local emergency plan. Stay upwind.
Environmental precautions	Try to stop release. Reduce vapour with fog or fine water spray.
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.

7. Handling and storage

Precautions for safe handling

Protective measures	Put on appropriate personal protective equipment (see Section 8). Contains gas under pressure. Do not get in eyes or on skin or clothing. Use only with adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Do not enter storage areas and confined spaces unless adequately ventilated. Do not puncture or incinerate container. Use equipment rated for cylinder pressure. Close valve after each use and when empty. Protect cylinders from physical damage; do not drag, roll, slide, or drop. Use a suitable hand truck for cylinder movement. Use only non-sparking tools. Empty containers retain product residue and can be hazardous. Store and use away from heat, sparks, open flame or any other ignition source. Use explosion-proof electrical (ventilating, lighting and material handling) equipment. Do not breathe gas. Avoid exposure - obtain special instructions before use. Do not handle until all safety precautions have been read and understood.
Advice on general occupational hygiene	Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas.
Conditions for safe storage, including any incompatibilities	Store in accordance with local regulations. Store in a segregated and approved area. Store away from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials. Eliminate all ignition sources. Cylinders should be stored upright, with valve protection cap in place, and firmly secured to prevent falling or being knocked over.



Cylinder temperatures should not exceed 52 °C (125 °F). Store locked up. Keep container tightly closed and sealed until ready for use.

8. Exposure Control / Personal Protection

Control parameters - Occupational Exposure limits

Ingredient name	Exposure limits
Ethylene oxide	<p>ACGIH TLV (United States, 3/2019). TWA: 1 ppm 8 hours.</p> <p>NIOSH REL (United States, 10/2016). CEIL: 9 mg/m³ 10 minutes. CEIL: 5 ppm 10 minutes. TWA: 0.18 mg/m³ 10 hours. TWA: 0.1 ppm 10 hours.</p> <p>OSHA PEL (United States, 5/2018). STEL: 5 ppm 15 minutes. TWA: 1 ppm 8 hours.</p> <p>OSHA PEL 1989 (United States, 3/1989). STEL: 5 ppm 15 minutes. TWA: 1 ppm 8 hours.</p>
Appropriate Engineering Control	Use only with adequate ventilation. Use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits. The engineering controls also need to keep gas, vapor or dust concentrations below any lower explosive limits. Use explosion-proof ventilation equipment.
Environmental exposure controls	Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.
Individual protection measures	
Hygiene measures	Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.



Eye/face protection	Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists, gases or dusts. If contact is possible, the following protection should be worn, unless the assessment indicates a higher degree of protection: chemical splash goggles.
Skin protection	
Hand protection	Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary. If contact with the liquid is possible, insulated gloves suitable for low temperatures should be worn. Considering the parameters specified by the glove manufacturer, check during use that the gloves are still retaining their protective properties. It should be noted that the time to breakthrough for any glove material may be different for different glove manufacturers. In the case of mixtures, consisting of several substances, the protection time of the gloves cannot be accurately estimated.
Body protection	Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product. When there is a risk of ignition from static electricity, wear antistatic protective clothing. For the greatest protection from static discharges, clothing should include anti-static overalls, boots and gloves.
Other skin protection	Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.
Respiratory protection	Based on the hazard and potential for exposure, select a respirator that meets the appropriate standard or certification. Respirators must be used according to a respiratory protection program to ensure proper fitting, training, and other important aspects of use.
Thermal hazards	If there is a risk of contact with the liquid, all protective equipment worn should be suitable for use with extremely low temperature materials.

9. Physical and chemical properties

Physical state	Liquefied gas
Color	Colourless
Odor	fruity
Melting point/freezing point	Melting point/range: -111 °C - lit.
Initial boiling point and boiling range	10.7 °C - lit.



Flammability (solid,gas)	Chemically unstable at 20 °C temperature and a standard pressure of 101.3 kPa
Upper/lower flammability or explosive limits	Upper explosion limit: 99 %(V) Lower explosion limit: 3 %(V)
Flash point	-20,0 °C - closed cup
Autoignition temperature	429.0 °C at 1.013 hPa
Decomposition temperature	No data available
pH	7.0 at 20 °C
Viscosity	Kinematic Viscosity: No data available Dynamic Viscosity: No data available
Water solubility	at 20 °C miscible in all proportions
Partition coefficient: n-octanol/water	log Pow: -0.3 at 25 °C - Bioaccumulation is not expected.
Vapor pressure	1.456 hPa at 20 °C
Density	0.882 g/cm ³ at 25 °C - lit.
Relative density	1.950 at 0 °C
Relative vapor density	No data available
Particle characteristics	No data available
Explosive properties	Explosive with or without contact with air.
Oxidizing properties	none

10. Stability and reactivity

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Reactivity	No reactivity hazard other than the effects described in sub-sections below.
Chemical stability	Containers are commonly pressurised to 5-7 bars with nitrogen. May polymerise. May react explosively even in the absence of air.
Possibility of hazardous reactions	Can form explosive mixture with air. May react violently with oxidants.
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.
Incompatible materials	Air, Oxidisers. For additional information on compatibility refer to ISO 11114.
Hazardous decomposition products	Under normal conditions of storage and use, hazardous decomposition products should not be produced.

11. Toxicological information



Information on Toxicological Effects

Acute toxicity	LD50 Oral - Rat - 72,0 mg/kg Remarks: (RTECS) Acute toxicity estimate Oral - 72 mg/kg (ATE value derived from LD50/LC50 value) LC50 Inhalation - Rat - male and female - 4 h - 2.76 mg/l - vapor (OECD Test Guideline 403) Acute toxicity estimate Inhalation - 2.76 mg/l - vapor (ATE value derived from LD50/LC50 value) Dermal: No data available
Skin corrosion/irritation	Skin - Rabbit Result: Causes burns. - 1 - 60 min Remarks: (ECHA) Remarks: Classified according to Regulation (EU) 1272/2008, Annex VI (Table 3.1/3.2)
Serious eye damage/eye irritation	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
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)

12. Ecological information

Toxicity

Toxicity to fish	static test LC50 - Oncorhynchus mykiss (rainbow trout) - 52 mg/l - 96 h (US-EPA)
Toxicity to daphnia and other aquatic invertebrates	static test LC50 - Daphnia magna (Water flea) - 350 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)
Persistence and degradability	Biodegradability: aerobic - Exposure time 14 d Result: >= 83 % - Readily biodegradable. (OECD Test Guideline 301C)
Bio accumulative potential	No data available
Mobility in soil	No data available

Results of PBT and vPvB assessment	This substance/mixture contains no components considered to be either persistent, Bio accumulative and toxic (PBT), or very persistent and very bio accumulative (vPvB) at levels of 0.1% or higher.
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Endocrine disrupting properties - Product:









Assessment	The substance/mixture does not contain components considered to have endocrine disrupting properties according to REACH Article 57(f) or Commission Delegated regulation (EU) 2017/2100 or Commission Regulation (EU) 2018/605 at levels of 0.1% or higher.
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13. Disposal considerations

Disposal methods	The generation of waste should be avoided or minimized wherever possible. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of all authorities with jurisdiction. Empty Airgas-owned pressure vessels should be returned to Airgas. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible. This material and its container must be disposed of in a safe way. Empty containers or liners may retain some product residues. Do not puncture or incinerate container.
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14. Transport information



	DOT	TDG	IMDG	IATA
UN number	UN1040	UN1040	UN1040	UN1040
UN proper shipping name	Ethylene Oxide	Ethylene Oxide	Ethylene Oxide	Ethylene Oxide
Transport hazard class(es)	2.3 (2.1)  	2.3 (2.1)  	2.3 (2.1)  	2.3 (2.1)  
Packing group	-	-	-	-
Environmental hazards	No.	No.	No.	No.

Refer to CFR 49 (or authority having jurisdiction) to determine the information required for shipment of the product.”

Additional information

DOT Classification	Toxic - Inhalation hazard Zone C Reportable quantity 10 lbs / 4.54 kg. Package sizes shipped in quantities less than the product reportable quantity are not subject to the RQ (reportable quantity) transportation requirements.
TDG Classification	Product classified as per the following sections of the Transportation of Dangerous Goods Regulations: 2.13-2.17 (Class 2), 2.13-2.17 (Class 2). Explosive Limit and Limited Quantity Index 0 ERAP Index 500 Passenger Carrying Vessel Index Forbidden Passenger Carrying Road or Rail Index Forbidden
IATA	Quantity limitation Passenger and Cargo Aircraft: Forbidden. Cargo Aircraft Only: Forbidden.
Special precautions for user	Transport within user's premises: always transport in closed containers that are upright and secure. Ensure that persons transporting the product know what to do in the event of an accident or spillage.
Transport in bulk according to IMO instruments	Not available.



15. Regulatory information

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

This material safety data sheet complies with the requirements of Regulation (EC) No.1907/2006.

Authorisations and/or restrictions on use	
REACH - Restrictions on the manufacture, placing on the market and use of certain dangerous substances, mixtures and articles (Annex XVII)	ethylene oxide
National legislation	
Seveso III: Directive 2012/18/EU of the European Parliament and of the Council on the control of major-accident hazards involving dangerous substances.	H2 - ACUTE TOXIC P2 - FLAMMABLE GASES 20 - Ethylene oxide
Other regulations	Observe work restrictions regarding maternity protection in accordance to Dir 92/85/EEC or stricter national regulations where applicable. Take note of Dir 94/33/EC on the protection of young people at work.
Chemical Safety Assessment	For this product a chemical safety assessment was not carried out.

16. Any other information

History

Product name
Product code
Date of printing
Date of issue/Date of revision
Date of previous issue
Version
Prepared by

17. Change Details