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SAFETY DATA SHEETS

According to the UN GHS revision 9

Version: 1.2
Creation Date: July 15, 2019
Revision Date: August 08, 2025

SECTION 1: Identification

1.1 GHS Product identifier

Product name Reference Material for Ethylene Oxide in Methanol

1.2 Other means of identification

Product number CPRM6612
Other names -

1.3 Recommended use of the chemical and restrictions on use

Identified uses For laboratory and Industrial use only.
Uses advised against no data available

1.4 Supplier's details

Company CATO Research Chemicals Inc.
Address 3/F,Building B,No.179 BASIGO, Guangpu Rd East,Huangpu Dist,Guangzhou
Telephone +86-20-81960175

1.5 Emergency phone number

Emergency phone number +86-20-81960175
Service hours 'Monday to Friday, 9am-5pm (Standard time zone: UTC/GMT +8 hours).

SECTION 2: Hazard identification

2.1 Classification of the substance or mixture

Gases under pressure: Liquefied gas
Flammable gases, Category 1A, Flammable gas
Acute toxicity - Category 3, Oral
Skin corrosion, Category 1
Serious eye damage, Category 1
Acute toxicity - Category 3, Inhalation
Specific target organ toxicity – single exposure, Category 3
Specific target organ toxicity – single exposure, Category 3
Germ cell mutagenicity, Category 1B
Carcinogenicity, Category 1B
Specific target organ toxicity – repeated exposure, Category 1
Reproductive toxicity, Category 1B

2.2 GHS label elements, including precautionary statements

Pictogram(s)



Signal word Danger
Hazard statement(s)
H220 Extremely flammable gas
H301 Toxic if swallowed
H314 Causes severe skin burns and eye damage
H331 Toxic if inhaled
H335 May cause respiratory irritation
H336 May cause drowsiness or dizziness
H340 May cause genetic defects
H350 May cause cancer
H372 Causes damage to organs through prolonged or repeated exposure

Precautionary statement(s)

Prevention	P210 Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. P264 Wash ... thoroughly after handling. P270 Do not eat, drink or smoke when using this product. P260 Do not breathe dust/fume/gas/mist/vapours/spray. P280 Wear protective gloves/protective clothing/eye protection/face protection/hearing protection/... P261 Avoid breathing dust/fume/gas/mist/vapours/spray. P271 Use only outdoors or in a well-ventilated area. P203 Obtain, read and follow all safety instructions before use.
Response	P377 Leaking gas fire: Do not extinguish, unless leak can be stopped safely. P381 In case of leakage, eliminate all ignition sources. P301+P316 IF SWALLOWED: Get emergency medical help immediately. P321 Specific treatment (see ... on this label). P330 Rinse mouth. P301+P330+P331 IF SWALLOWED: Rinse mouth. Do NOT induce vomiting. P363 Wash contaminated clothing before reuse. P304+P340 IF INHALED: Remove person to fresh air and keep comfortable for breathing. P316 Get emergency medical help immediately. P305+P351+P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. P305+P354+P338 IF IN EYES: Immediately rinse with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. P317 Get medical help. P319 Get medical help if you feel unwell. P318 IF exposed or concerned, get medical advice.
Storage	P410+P403 Protect from sunlight. Store in a well-ventilated place. P403 Store in a well-ventilated place. P405 Store locked up. P403+P233 Store in a well-ventilated place. Keep container tightly closed.
Disposal	P501 Dispose of contents/container to an appropriate treatment and disposal facility in accordance with applicable laws and regulations, and product characteristics at time of disposal.

2.3 Other hazards which do not result in classification

no data available

SECTION 3: Composition/information on ingredients

3.1 Substances

Chemical name	Common names and synonyms	CAS number	EC number	Concentration
Reference Material for Ethylene Oxide in Methanol	Ethylene oxide	75-21-8	200-849-9	100%

SECTION 4: First-aid measures

4.1 Description of necessary first-aid measures

If inhaled

Fresh air, rest. Refer for medical attention.

Following skin contact

Remove contaminated clothes. ON FROSTBITE: rinse with plenty of water, do NOT remove clothes. Rinse skin with plenty of water or shower. Refer for medical attention .

Following eye contact

First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then refer for medical attention.

Following ingestion

Rinse mouth with water. Do not induce vomiting. Never give anything by mouth to an unconscious person. Call a doctor or Poison Control Center immediately.

4.2 Most important symptoms/effects, acute and delayed

It can cause death. Lowest inhalation concentration causing toxic effects is 12500 ppm/10 seconds. It is a strong skin irritant. Neurological disorders and even death have been reported. (EPA, 1998)

4.3 Indication of immediate medical attention and special treatment needed, if necessary

Establish and maintain vital functions. ... Administer warm humidified oxygen and bronchodilators, if needed. Treat cardiac dysrhythmias and control convulsions with standard treatments. Monitor for several hours after exposure. Significant exposure usually causes effects that indicate hospital admission.

SECTION 5: Fire-fighting measures

5.1 Suitable extinguishing media

GAS: Poisonous gases are produced in fire. Do not estinguish the fire unless the flow of gas can be stopped and any remaining gas is out of the line. Specially trained personnel may use fog lines to cool exposures and let the fire burn itself out. Vapors are heavier than air and will collect in low areas. Vapors may travel long distances to ignition sources and flashback. Vapors in confined area may explode in fire. Storage containers and parts of containers may rocket great distances, in many directions. If materials or contaminated runoff enters waterways, notify downstream users of potentially contaminated waters. Notify local health and fire officials and pollution control agencies. From a secure, explosion-proof location, use water spray to cool exposed containers. If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors, or shows any signs of deforming), withdraw immediately to a secure position. If employees are expected to fight fires, they must be trained and equipped. LIQUID: Poisonous gases are produced in fire. Use dry chemical, carbon dioxide, or foam extinguishers. Although soluble in water, solutions will continue to burn until diluted to approximately 22 volumes of water to one volume of ethylene oxide. Vapors are heavier than air and will collect in low areas. Vapors may travel long distances to ignition sources and flashback. Vapors in confined area may explode in fire. Storage containers and parts of containers may rocket great distances, in many directions. If materials or contaminated runoff enters waterways, notify downstream users of potentially contaminated waters. Notify local health and fire officials and pollution control agencies. From a secure, explosion-proof location, use water spray to cool exposed containers. If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors, or shows any signs of deforming), withdraw immediately to a secure position. If employees are expected to fight fires, they must be trained and equipped.

5.2 Specific hazards arising from the chemical

Severe explosion hazard when exposed to heat or flame. Irritating vapors are generated when heated. Vapor is heavier than air and may travel considerable distance to a source of ignition and flash back. Vapor forms explosive mixtures with air over a wide range. Liquid is not detonable but the vapor may be readily initiated into explosive decomposition. Avoid metal fittings containing copper, silver, mercury or magnesium; ammonia, oxidizing agents; acids, organic bases; amines; certain salts; alcohols; mercaptans, ferric chloride; magnesium perchlorate; m-nitroaniline; trimethylamine, potassium, tin chlorides; alkanethiols; bromoethane; aluminum chloride; aluminum oxide; iron chlorides; and iron oxides. Avoid air, heat, acids and bases, metal or metal chloride catalysts. Hazardous polymerization may occur. Avoid acids; covalent halides such as chlorides of aluminum, iron (III), tin (IV); basic materials like alkali hydrides, ammonia, amines, and potassium; catalytically active solids such as aluminum or iron oxides or rust, chlorides of boron, aluminum, tin, and iron; some carbonates; and metals such as copper and copper alloys (EPA, 1998)

5.3 Special protective actions for fire-fighters

Shut off supply; if not possible and no risk to surroundings, let the fire burn itself out. In other cases extinguish with powder, alcohol-resistant foam, water spray, carbon dioxide. In case of fire: keep cylinder cool by spraying with water. Combat fire from a sheltered position.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

Evacuate danger area! Consult an expert! Personal protection: gas-tight chemical protection suit including self-contained breathing apparatus. Ventilation. Do NOT wash away into sewer. NEVER direct water jet on liquid. Remove gas with fine water spray.

6.2 Environmental precautions

Evacuate danger area! Consult an expert! Personal protection: gas-tight chemical protection suit including self-contained breathing apparatus. Ventilation. Do NOT wash away into sewer. NEVER direct water jet on liquid. Remove gas with fine water spray.

6.3 Methods and materials for containment and cleaning up

GAS: Evacuate and restrict persons not wearing protective equipment from area of spill or leak until cleanup is complete. Remove all ignition sources. Establish forced ventilation to keep levels below explosive limit. Stop the flow of gas if it can be done safely. If source of leak us a cylinder and the leak cannot be stopped in place, remove leaking cylinder to a safe place in the open air, and repair leak or allow cylinder to empty. Keep this chemical out of a confined space, such as a sewer, because of the possibility of an explosion, unless the sewer is designed to prevent the build-up of explosive concentrations. LIQUID: For small spills flush area with flooding amounts of water. For large spills, dike spill for later disposal. Absorb liquids in vermiculite, dry sand, earth, or a similar non-organic materials and deposit in sealed containers. May also be covered with weak reducing agents; resulting sludge neutralized and flushed to sewer. Collect powdered material in the most convenient and safe manner and deposit in sealed containers. Ventilate area of spill or leak after clean-up is complete. It may be necessary to contain and dispose of this chemical as a hazardous waste. If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated waters. Contact your Department of Environmental Protection or your regional office of the federal EPA for specific recommendations. If employees are required to clean-up spills, they must be properly trained and equipped.

SECTION 7: Handling and storage

7.1 Precautions for safe handling

NO open flames, NO sparks and NO smoking. Closed system, ventilation, explosion-proof electrical equipment and lighting. Use non-sparking handtools. Handling in a well ventilated place. Wear suitable protective clothing. Avoid contact with skin and eyes. Avoid formation of dust and aerosols. Use non-sparking tools. Prevent fire caused by electrostatic discharge steam.

7.2 Conditions for safe storage, including any incompatibilities

Fireproof. Cool.Prior to working with this chemical you should be trained on its proper handling and storage. Before entering a confined space where this chemical may be present, check to make sure that an explosive concentration does not exist. It must be stored to avoid contact with even small amounts of acids (such as nitric or sulfuric acids); alkalis (such as sodium bydroxide or potassium hydroxide); cataylic anhydrous chlorides of iron, aluminum or tin; iron or aluminum oxide; or metallic potassium hydroxide); catalytic anhydrous chlorides of iron, aluminum or tin; iron or aluminum oxide; or metallic potassium hydroxide, since it may react by itself, liberating much heat and causing a possible explosion. Ethylene oxide should not contact oxidizers (such as perchlorates, perxoides, permanganates, chlorates, and nitrates) since an explosion could occur. Store in tightly closed containers in a cool, well-ventilated area away from heat, sparks, or sunlight. Sources of ignition such as smoking and open flames are prohibited where ethlyene oxide is handled, used, or stored. Metal containers involving the transfer of 5 gallons or more of ethylene oxide should br grounded and bonded. Drums must be equipped with self-closing valves, pressure vacuum bungs, and flame arresters. Use only non-sparking tools and equipment, especially when opening

and closing containers of ethylene oxide . Wherever ethylene oxide is used, handled, manufactured, or stored, use explosion-proof electrical equipment and fittings.

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Occupational Exposure limit values

TLV: 1 ppm as TWA; A2 (suspected human carcinogen).EU-OEL: 1.8 mg/m3, 1 ppm as TWA; (skin).MAK: skin absorption (H); carcinogen category: 2; germ cell mutagen group: 2

Biological limit values

no data available

8.2 Appropriate engineering controls

Ensure adequate ventilation. Handle in accordance with good industrial hygiene and safety practice. Set up emergency exits and the risk-elimination area.

8.3 Individual protection measures, such as personal protective equipment (PPE)

Eye/face protection

Wear eye protection in combination with breathing protection.

Skin protection

Protective gloves. Cold-insulating gloves. Protective clothing.

Respiratory protection

Use closed system or ventilation.

Thermal hazards

no data available

SECTION 9: Physical and chemical properties and safety characteristics

Physical state	Ethylene oxide is a clear colorless gas with an ethereal odor with a flash point below 0°F. Liquid less dense than water. Vapors heavier than air. May polymerize exothermically if heated or contaminated. If the polymerization takes place inside a container, the container may rupture violently. Vapors very toxic. Vapors irritate the eyes, skin, and respiratory system. Prolonged skin contact may result in delayed burns. Used to make other chemicals, as a fumigant and industrial sterilant.
Colour	Colorless ... gas at ordinary room temp and pressure; liquid below 12 deg C
Odour	Sweet
Melting point/freezing point	-111°C(lit.)
Boiling point or initial boiling point and boiling range	10.7°C(lit.)
Flammability	Flammable Gas
Lower and upper explosion limit/flammability limit	Lower flammable limit: 3.0% by volume; Upper flammable limit: 100% by volume
Flash point	-20°C
Auto-ignition temperature	804° F (USCG, 1999)
Decomposition temperature	no data available
pH	no data available
Kinematic viscosity	9.45X10-3 mPa.s (25 deg C, gas) and 0.254 mPa.s (10 deg C, liquid)
Solubility	Miscible (NTP, 1992)
Partition coefficient n-octanol/water	log Kow = -0.30
Vapour pressure	1095 mm Hg at 68° F (EPA, 1998)
Density and/or relative density	0.882g/mLat 25°C(lit.)
Relative vapour density	1.49 (EPA, 1998) (Relative to Air)
Particle characteristics	no data available

SECTION 10: Stability and reactivity

10.1 Reactivity

NIOSH considers ethylene oxide to be a potential occupational carcinogen.
The substance may polymerize due to heating, under the influence of acids, bases, metal chlorides and metal oxides. This generates fire or explosion hazard. Decomposes above 560°C in the absence of air. This generates fire and explosion hazard. Reacts violently with many compounds.

10.2 Chemical stability

Hydrolyzes slowly in aq soln

10.3 Possibility of hazardous reactions

Flammable gas.The gas is heavier than air and may travel along the ground; distant ignition possible.Colorless gas at room temperature (b.p. 11° C), confirmed carcinogen. Highly flammable, severe explosion hazard when exposed to flame. The autoignition temperature may be as low as 140° C in presence of rust. Rapid compression of the vapor with air causes explosion. Ethylene oxide vapor may be initiated into explosive decomposition in absence of air [Hess, L. G., et al., Ind. Eng. Chem., 1950, 42, p. 1251]. Metal fittings containing magnesium, copper or silver should be avoided, since traces of acetylene in ethylene oxide may produce metal acetylides capable of detonating the vapor [MCA SD-38, 1971]. Violent polymerization occurs on contact with strong bases (alkali hydroxides, ammonia) or acids, amines, metallic potassium, oxides (aluminum oxide, iron oxide, rust), covalent halides (aluminum chloride, ferric chloride, tin(IV) chloride) [Gupta, A. K., J. Soc. Chem. Ind., 1949, 68, p. 179]. Violent reaction with m-nitroaniline, magnesium perchlorate, mercaptans, thiols, triethylamine [Bretherick, 5th ed., 1995, p. 316]. Ethylene oxide and SO2 can react violently in pyridine solution with pressurization if ethylene oxide is in excess (Nolan, 1983, Case History 51).

10.4 Conditions to avoid

no data available

10.5 Incompatible materials

Forms explosive mixture with air. Dangerously reactive; may rearrange chemically and/or polymerize violently with evolution of heat, when in contact with highly active catalytic surfaces such as anhydrous chlorides or iron, tin and aluminum, pure oxides of iron and aluminum, and alkali metal hydroxides. Even small amounts of strong acids, alkalis, oxidizers can cause a reaction. Avoid contact with copper. Protect container from physical damage, sun and heat. Attacks some plastics, rubber or coatings.

10.6 Hazardous decomposition products

Liquid ethylene oxide is not detonable, but the vapor may be readily initiated into explosive decomposition.

SECTION 11: Toxicological information

Acute toxicity

- Oral: LD50 Rat (male) oral 330 mg/kg From table
- Inhalation: LC50 Rat inhalation 1462 ppm/4 hr (2.63 mg/L)
- Dermal: no data available

Skin corrosion/irritation

no data available

Serious eye damage/irritation

no data available

Respiratory or skin sensitization

no data available

Germ cell mutagenicity

no data available

Carcinogenicity

NTP: Known to be a human carcinogen

Reproductive toxicity

Some evidence exists indicating that inhalation exposure to ethylene oxide can cause an increased rate of miscarriages in female workers. These effects could be seen from acute, as well as chronic, exposure. Various adverse reproductive effects have been noted in inhalation exposure studies of animals including decreased number of implantation sites, decreased testicular weights and sperm concentration, and testicular degeneration.

STOT-single exposure

The vapour is irritating to the eyes, skin and respiratory tract. Water solutions may cause skin blisters. Rapid evaporation of the liquid may cause frostbite.

STOT-repeated exposure

Repeated or prolonged contact may cause skin sensitization. Repeated or prolonged inhalation may cause asthma. The substance may have effects on the nervous system. This substance is carcinogenic to humans. May cause heritable genetic damage to human germ cells.

Aspiration hazard

A harmful concentration of this gas in the air will be reached very quickly on loss of containment.

SECTION 12: Ecological information

12.1 Toxicity

- Toxicity to fish: LC50; Species: Pimephales promelas (Fathead minnow); Conditions: freshwater, static, dechlorinated tap water, aerated; Concentration: 274000 ug/L for 24 hr (95% confidence interval: 150000-500000 ug/L) /formulated product
- Toxicity to daphnia and other aquatic invertebrates: LC50; Species: Daphnia magna (Water flea); Conditions: freshwater, static; Concentration: 260000 ug/L for 24 hr /formulated product
- Toxicity to algae: no data available
- Toxicity to microorganisms: no data available

12.2 Persistence and degradability

AEROBIC: In a dilution bottle test, ethylene oxide 3-5% degradation was observed after 5 days and 52% degradation was observed after 20 days(1,2). In a river die-away test, half-life measurements for ethylene oxide in sterile and natural river water were not appreciably different, owing to the hydrolytic degradation of ethylene oxide being more rapid than biodegradation in aqueous media(4). Since ethylene oxide hydrolyzes to ethylene glycol which is readily biodegraded, the importance of biodegradation of ethylene oxide in aquatic environments is not able to be accurately assessed(2). Ethylene oxide biodegradation rate constants measured at a full-scale wastewater treatment plant were 0.38 and 0.59 ug/min-g biomass(3).

12.3 Bioaccumulative potential

An estimated BCF of 3 was calculated in fish for ethylene oxide(SRC), using a log Kow of -0.30(1) and a regression-derived equation(2). According to a classification scheme(3), this BCF suggests the potential for bioconcentration in aquatic organisms is low(SRC).

12.4 Mobility in soil

Koc of ethylene oxide was reported to be 2.20(1). According to a classification scheme(2), this estimated Koc value suggests that ethylene oxide is expected to have very high mobility in soil(SRC).

12.5 Other adverse effects

no data available

SECTION 13: Disposal considerations

13.1 Disposal methods

Product

The material can be disposed of by removal to a licensed chemical destruction plant or by controlled incineration with flue gas scrubbing. Do not contaminate water, foodstuffs, feed or seed by storage or disposal. Do not discharge to sewer systems.

Contaminated packaging

Containers can be triply rinsed (or equivalent) and offered for recycling or reconditioning. Alternatively, the packaging can be punctured to make it unusable for other purposes and then be disposed of in a sanitary landfill. Controlled incineration with flue gas scrubbing is possible for combustible packaging materials.

SECTION 14: Transport information

14.1 UN Number

ADR/RID: UN1040 (For reference only, please check.) IMDG: UN1040 (For reference only, please check.) IATA: UN1040 (For reference only, please check.)

14.2 UN Proper Shipping Name

ADR/RID: ETHYLENE OXIDE, or ETHYLENE OXIDE WITH NITROGEN up to a total pressure of 1 MPa (10 bar) at 50 °C (For reference only, please check.) IMDG: ETHYLENE OXIDE, or ETHYLENE OXIDE WITH NITROGEN up to a total pressure of 1 MPa (10 bar) at 50 °C (For reference only, please check.) IATA: ETHYLENE OXIDE, or ETHYLENE OXIDE WITH NITROGEN up to a total pressure of 1 MPa (10 bar) at 50 °C (For reference only, please check.)

14.3 Transport hazard class(es)

ADR/RID: 2.3 (For reference only, please check.) IMDG: 2.3 (For reference only, please check.) IATA: 2.3 (For reference only, please check.)

14.4 Packing group, if applicable

ADR/RID: (For reference only, please check.) IMDG: (For reference only, please check.) IATA: (For reference only, please check.)

14.5 Environmental hazards

ADR/RID: No IMDG: No IATA: No

14.6 Special precautions for user

no data available

14.7 Transport in bulk according to IMO instruments

no data available

SECTION 15: Regulatory information

15.1 Safety, health and environmental regulations specific for the product in question

Chemical name	Common names and synonyms	CAS number	EC number
Ethylene oxide	Ethylene oxide	75-21-8	200-849-9
European Inventory of Existing Commercial Chemical Substances (EINECS)			Listed.
EC Inventory			Listed.

United States Toxic Substances Control Act (TSCA) Inventory	Listed.
China Catalog of Hazardous chemicals 2015	Listed.
New Zealand Inventory of Chemicals (NZIoC)	Listed.
Philippines Inventory of Chemicals and Chemical Substances (PICCS)	Listed.
Vietnam National Chemical Inventory	Listed.
Chinese Chemical Inventory of Existing Chemical Substances (China IECSC)	Listed.
Korea Existing Chemicals List (KECL)	Listed.

SECTION 16: Other information

Information on revision

Creation Date	July 15, 2019
Revision Date	August 08, 2025

Abbreviations and acronyms

- CAS: Chemical Abstracts Service
- ADR: European Agreement concerning the International Carriage of Dangerous Goods by Road
- RID: Regulation concerning the International Carriage of Dangerous Goods by Rail
- IMDG: International Maritime Dangerous Goods
- IATA: International Air Transportation Association
- TWA: Time Weighted Average
- STEL: Short term exposure limit
- LC50: Lethal Concentration 50%
- LD50: Lethal Dose 50%
- EC50: Effective Concentration 50%

References

- IPCS - The International Chemical Safety Cards (ICSC), website: http://www.ilo.org/dyn/icsc/showcard.home
- HSDB - Hazardous Substances Data Bank, website: https://toxnet.nlm.nih.gov/newtoxnet/hsdb.htm
- IARC - International Agency for Research on Cancer, website: http://www.iarc.fr/
- eChemPortal - The Global Portal to Information on Chemical Substances by OECD, website: http://www.echemportal.org/echemportal/index?pageID=0&request_locale=en
- CAMEO Chemicals, website: http://cameochemicals.noaa.gov/search/simple
- ChemIDplus, website: http://chem.sis.nlm.nih.gov/chemidplus/chemidlite.jsp
- ERG - Emergency Response Guidebook by U.S. Department of Transportation, website: http://www.phmsa.dot.gov/hazmat/library/erg
- Germany GESTIS-database on hazard substance, website: http://www.dguv.de/ifa/gestis/gestis-stoffdatenbank/index-2.jsp
- ECHA - European Chemicals Agency, website: https://echa.europa.eu/

Other Information

Anyone who has shown symptoms of asthma due to this substance should avoid all further contact.The symptoms of asthma often do not become manifest until a few hours have passed and they are aggravated by physical effort. Rest and medical observation are therefore essential.Turn leaking cylinder with the leak up to prevent escape of gas in liquid state.The odour warning when the exposure limit value is exceeded is insufficient.

Any questions regarding this SDS, Please send your inquiry to info@cato-chem.com

Disclaimer: The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. We as supplier shall not be held liable for any damage resulting from handling or from contact with the above product.