



SAFETY DATA SHEET
MIXTURE ETHYLENE OXIDE 9%
CARBON DIOXIDE 91%

Page : 1/10
Edition : 5
Eff Date : 12/5/2021

1. IDENTIFICATION OF THE SUBSTANCE / PREPARATION AND OF THE COMPANY

Product name	Mixture Ethylene Oxide 9% / Carbon Dioxide 91%
Chemical formula	C ₂ H ₄ O+CO ₂
CAS Number	8070-50-6
UN Number	1952
Uses	Medical sterilization; chemical intermediate; biocides and other industrial use.
Synonyms	Carbon dioxide/ethylene oxides, mixtures, conc carbon dioxide >91%; Ethylene oxide/ Carbon dioxide, mixtures, conc ethylene oxide <9%;
Company	BALCHEM SDN BHD No. 37, Lorong Sungai Puloh 1A/KU6, Taman Teknologi Gemilang, Kaw. Perindustrian Sg. Puloh, 41050, Klang, Selangor, Malaysia T: +60 3 3290 2263 F: +60 3 3290 2016 E: E:info.asiapacific@balchem.com I: www.balchem.com
Emergency Contact	CARECHEM 24 +61280144558 Malaysia 999

2. HAZARDS IDENTIFICATION

UN Number 1952

Hazard Classification 2.2: Non-flammable, non-poisonous gas

2.1 GHS classification

Hazard Identification

GHS04 – Gas under pressure: may explode if heated	H280 / liquefied gas
GHS06 – Toxic by Inhalation	H332 / category 4
GHS07 – Warning. Acute Toxicity	H331 / category 4
GHS08 – Irritating to eyes, respiratory system and skin	H335 / category 3
GHS08 – May cause cancer	H350 / category 1B
GHS08 – May cause inheritable genetic defects	H340 / category 1B
GHS08 – May cause damage to organs through prolonged exposure	H373 / category 1B



SAFETY DATA SHEET
MIXTURE ETHYLENE OXIDE 9%
CARBON DIOXIDE 91%

Page : 2/10
Edition : 5
Eff Date : 12/5/2021

GHS classification

Hazard pictograms / symbols



GHS04



GHS06



GHS07



GHS08

2.2 Classified as dangerous according to the criteria of Regulation EC No 1272/2008

Hazard Statement for physical hazards

H280 Liquefied gas (may contain gas under pressure)

Hazard Statements for Health Hazards

H332 Harmful if inhaled.
H373 May cause damage to organs through prolonged or repeated exposure
H340 May cause genetic defects
H350 May cause cancer

Prevention

P202 Do not handle until all safety precautions have been read and understood.
P260 Do not breathe gas/vapours.
P271 Use only outdoors or in a well-ventilated area.
P280 Wear protective gloves/protective clothing/eye protection/face protection.

Response

P304+P340 IF INHALED. Remove person to fresh air and keep comfortable for breathing.
P314 Get medical advice/attention if you feel unwell.

Storage

P405 Store locked up.
P410 + P403 Protect from sunlight. Store in well-ventilated place

Other hazards

Carbon dioxide component is under high pressure but is generally non-toxic. Ethylene oxide is liquified gas at room temperature. Ethylene oxide is poisonous and flammable at high percentage composition but as a mixture of <9% in carbon dioxide, it is classified as Hazard Class 2.2 (non-flammable and non-poison).



SAFETY DATA SHEET
MIXTURE ETHYLENE OXIDE 9%
CARBON DIOXIDE 91%

Page : 3/10
Edition : 5
Eff Date : 12/5/2021

3. COMPOSITION / INFORMATION ON INGREDIENTS

Substance/Preparation

Compressed gases mixture

Components/Impurities

Contains a mixture of liquified ethylene oxide and compressed carbon dioxide gas. Chemical toxicities are mainly due to ethylene oxide while carbon dioxide is generally non-toxic.

CAS Number	EC Number (from EINECS)	Name	%(Weight)
75-21-8	200-849-9	Ethylene oxide	9
124-38-9	200-696-9	Carbon Dioxide	91
8070-50-6	-	Ethylene Oxide and carbon dioxide mixture, with not more than 9% EtO	

4. FIRST AID MEASURES

General Information

General Information

Take appropriate steps to avoid fire, explosion and inhalation hazards.
Adhere to personal protective measures when giving first aid.
Seek medical treatment immediately.

Inhalation

Remove the casualty into fresh air and keep him immobile.
Seek medical treatment immediately.
In case of respiratory standstill give artificial respiration using a respirator.
Send for a doctor.

Skin / eye contact

In case of contact with skin wash off immediately and for a long time (at least 15 minutes) with plenty of water.
In case of eye contact, rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do.
Call for a doctor immediately.

Ingestion

Ingestion is not considered a potential route of exposure.



SAFETY DATA SHEET
MIXTURE ETHYLENE OXIDE 9%
CARBON DIOXIDE 91%

Page : 4/10
Edition : 5
Eff Date : 12/5/2021

5. FIRE FIGHTING MEASURES

Specific Hazards	Exposure to fire may cause containers to rupture/explode.
Hazard combustion products	Incomplete combustion may form carbon monoxide
Suitable extinguishing media	Preferably CO ₂ or powder.
Unsuitable extinguishing	Full water jet (MUST NOT be used for safety reason)
Specific Methods	If possible. Stop flow of product. Continue water spray from protected position until container stays cool. Extinguish any other fire.
Protective equipment	Use self-contained breathing apparatus

6. ACCIDENTAL RELEASE MEASURES

Personal precautions	Evacuate area Use self –contained breathing apparatus and chemically protective clothing Ensure adequate air ventilation
Environmental precautions	Try to stop release Prevent from entering sewers, and water systems. Reduce vapor with fog or fine water spray.
Clean up methods	Keep area evacuated Ventilate area Let any spill evaporate. Apply exhaust fan if possible. Hose down area with water. Wash contaminated equipment or sites of leaks with large quantities of water.



SAFETY DATA SHEET
MIXTURE ETHYLENE OXIDE 9%
CARBON DIOXIDE 91%

Page : 5/10
Edition : 5
Eff Date : 12/5/2021

7. HANDLING AND STORAGE

Handling

Use ONLY in thoroughly ventilated areas.
Protect cylinder from any physical damage. Do not drop, drag, roll or slide cylinder.
Do not let any water to be introduced into container with EtO.
Purge dry air into container and gas-flow system before introducing gas.

Use only specified equipment to handle this product with specified safe pressure and temperature.
Refer to supplier's handling instructions.
Contact gas supplier if in doubt.

Storage

Secure cylinders to the correct positioning.
Keep in dry well-ventilated area.
The gas cylinders must be adequately earth during storage.
Segregate from oxidant gases and other oxidizing agents

Keep containers tightly closed and dry.

Storage condition: -

- In a cool, dry and well-ventilated area
- Away from direct sunlight. Protect from the heat (storage temperature $\leq 50^{\circ}\text{C}$)

8. EXPOSURE CONTROL / PERSONAL PROTECTION

Exposure Limit value

Ethylene Oxide:

OSHA Time Weighted Average exposure limit (TWA): 1 ppm
OSHA Short Term Exposure Limit (STEL): 5 ppm

Carbon Dioxide:

OSHA Time Weighted Average exposure limit (TWA): 5,000 ppm
OSHA Short Term Exposure Limit (STEL): 30,000 ppm

Engineering measure

Provide adequate general and local exhaust ventilation to maintain concentrations below exposure and flammable limits.

Personal protective equipment

Respiratory protection may not be required unless in case of leakage, use self – contained breathing apparatus.
Use appropriate gloves and protective clothing for hand and skin protection.
Use safety glasses or ventilated goggle for eye protection.
A safety shower and eyewash station should be readily available.



SAFETY DATA SHEET
MIXTURE ETHYLENE OXIDE 9%
CARBON DIOXIDE 91%

Page : 6/10
Edition : 5
Eff Date : 12/5/2021

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical state at 20°C	High pressure liquefied gases mixture
Colour	Colourless gas mixture
Odour	Sweet, ether-like smell as derived from odour of ethylene oxide
Flammability	Not easily combustible
Melting Point	CO ₂ : -75.5 °C (sublimation point) EtO: -112 °C
Boiling Point	CO ₂ sublime directly to gaseous form at -78.5 °C EtO: 10.6 °C
Flash Point	CO ₂ does not combust at any temperature. EtO: -18 °C (open cup) Mixture flash point is not known.
Vapour pressure, 20°C	CO ₂ is a gas at -20 °C EtO: 1.4 Bar
Relative vapor density	About 1.5 (air = 1)
Relative density, 20°C	EtO: 0.82 (water = 1) CO ₂ is a gas at 20 °C. Mixture < 0.82
Solubility in water	CO ₂ : 0.7 mole ratio at 20 °C and 1 atm pressure EtO: completely miscible in water (1,000 g/L)
Auto ignition temperature	EtO: 429 °C Mixture : data not available
Other data	Gases mixture is heavier than air. May accumulate in confined spaces, particularly at or below ground level.



SAFETY DATA SHEET
MIXTURE ETHYLENE OXIDE 9%
CARBON DIOXIDE 91%

Page : 7/10
Edition : 5
Eff Date : 12/5/2021

10. STABILITY AND REACTIVITY

Stability	Flammability of ethylene oxide is reduced in this mixture with >90% carbon dioxide. Carbon dioxide is stable and not reactive.
Conditions to avoid	Air or oxygen Water, humidity High temperatures
Materials to avoid	Oxidizing agents, acids, organic bases, amines, ammonia and certain salts. EtO reacts explosively with certain alcohols or mercaptans. EtO reacts with HCl to form highly toxic ethylene chlorohydrins. Avoid copper, silver, magnesium, mercury and their salts.

11. TOXICOLOGICAL INFORMATION

Acute toxicity	Ethylene Oxide LD ₅₀ /oral/rat: 72 mg/kg LC ₅₀ /inhal/rat: 2.92 mg / l / 15 min 1.44 mg / l / 4h Carbon dioxide Relatively non-toxic IDLH conc: 40,000 ppm (IDLH: Immediate Danger to Life and Health) Ethylene Oxide ≤ 9% / Carbon Dioxide – No data on acute toxicity is available for this mixture but presence of highly toxic ethylene oxide is a concern to human health.
Skin Irritation/Sensitization	No data is available for mixture but even in small proportion, ethylene oxide is very irritating and may cause allergy reaction
Eye Irritation/Damage	Ethylene Oxide component in this mixture may cause serious eye irritation
Inhalation/Respiratory Sensitization	Ethylene Oxide component even in small percentage composition may cause respiratory tract irritation and may cause allergy reaction.
Carcinogenicity	Ethylene Oxide IARC Classification Group 1: Carcinogenic to Human and thus the mixture is still considered a carcinogenic chemical.
Mutagenicity	No data is available for the mixture but ethylene oxide is a mutagenic compound.



SAFETY DATA SHEET
MIXTURE ETHYLENE OXIDE 9%
CARBON DIOXIDE 91%

Page : 8/10
Edition : 5
Eff Date : 12/5/2021

Teratogenicity No data is available for this mixture of 9% EtO in CO₂.

Further information No study have been conducted on the toxicity of a 9% EtO and 91% CO₂. However, care should be taken to reduce excessive exposure to this gas mixture for health safety reason.

12. ECOLOGICAL INFORMATION

General Ecological Impact No studies have been made on the ecological impact of the mixture of 9% EtO + 91% CO₂. However, any release to the environment may consider the impact of individual component as they will act independently as follow;

Carbon Dioxide is a major green-house gas which contribute to Climate Change and other ecological impact of Green-house gases. Other than that carbon dioxide is not harmful to the environment.
Ethylene Oxide is toxic and harmful to the environment.

Environmental Fate **Ethylene oxide** is highly reactive. Thus, it does not persist indefinitely in the environment. It is also very soluble in water. EtO will be converted gradually to ethylene glycol in the environment.

Aquatic Toxicity **Ethylene Oxide** environmental toxicity;
LC₅₀ (Fat Minnow): 84 mg/L (96 hr exposure)
LC₅₀ (Daphnia magna): 137 – 300 mg/L (48hr exposure)

Mobility **Ethylene Oxide:**
Atmosphere: Somewhat persistent in the atmosphere but will ultimately degrade by process of photolysis.
Soil: Does not readily dissolved in soil and gradually will convert to ethylene glycol.
Water: Very soluble in water but easily convert to ethylene glycol.

Persistence/degradability **Ethylene Oxide** will readily undergoes biodegradation and hydrolysis in water and soil.

Bio-accumulation **Ethylene Oxide** does not bio-accumulate significantly.



SAFETY DATA SHEET
MIXTURE ETHYLENE OXIDE 9%
CARBON DIOXIDE 91%

Page : 9/10
Edition : 5
Eff Date : 12/5/2021

13. DISPOSAL CONSIDERATION

Waste Disposal Do not dispose remaining gas to the environment. Return container and cylinder to supplier.

Additional Information **Ethylene oxide** is also used as fumigant. Regulation of disposal of pesticides and containers of pesticides may apply.
Do not attempt to refill cylinder with other gases or chemicals.

14. TRANSPORT INFORMATION

Proper shipping name	Ethylene Oxide and Carbon Dioxide mixture
UN Number	UN1952
Hazard Class	2.2 – Non-Flammable and Non-poisonous Gas
ADR/RID Classification Code	2TF
ADR/RID Hazard Nr	263
Packing Group	None
Labeling ADR	Label 2.2: Non-Flammable and Non-poisonous
IMDG EmS codes	F-D, S-U
IMDG Marine pollutant	No
Passenger Aircraft	Forbidden

SPECIAL SHIPPING INFORMATION: Cylinders should be transported in a secure position, in a well-ventilated vehicle.

15. REGULATORY INFORMATION

Department of Occupational Safety and Health, Ministry of Human Resources, Malaysia, Industrial Code of Practice on Chemicals Classification and Hazard Communication, 2014 did not classify this gas mixture as hazardous material but for safety purposes, classification for 100% **ethylene oxide** should be applied as follows;

Chemical Name:	ETHYLENE OXIDE	
CAS No.	75-21-8	
Classification	<u>H-Code</u>	<u>Classification Code</u>
	H280/281	Pressurized Gas
	H220	Flam. Gas 1
	H350	Car. 1B



SAFETY DATA SHEET
MIXTURE ETHYLENE OXIDE 9%
CARBON DIOXIDE 91%

Page : 10/10
Edition : 5
Eff Date : 12/5/2021

H340	Muta. 1B
H331	Acute Tox. 3 (inh)
H319	Eye Irrit. 2
H335	STOT SE 3
H315	Skin Irrit. 2

16. OTHER INFORMATION

The information and opinion presented herein are based on data and scientific information currently available. Since the use of information in this Safety Data Sheet and the conditions of use are not within the control of Balchem Sdn. Bhd., it is the user's obligation to determine the conditions for safe use of this product.

Ensure all national and local regulations are observed. Ensure operators and handlers of this product understand the hazard and toxicological effect from accidental and unnecessary exposure.

While proper care has been taken in the preparation of this document, no liability for injury or damage resulting from its use can be accepted by the manufacturer.

Edited by: Dr. Md. Sani Ibrahim (PhD in Organic Chemistry)
e-mail: sani@sanichem.com.my
Date: 25 January 2019