

## GPS Safety Summary

This Product Safety Summary is intended to provide a brief overview of the information on the risk assessment results of the chemical product that we manufacture based on the chemical industry's Global Product Strategy (GPS) to the general public as a social responsibility of a company that manufacture chemical substances.

This summary is not intended to provide technical information including effects on human health and the environment and details of risk assessment. In addition, it is not intended to be prepared as a document to replace a Safety Data Sheet (SDS) or a risk assessment report like a Chemical Safety Report under the REACH (Registration, Evaluation, Authorization and Restriction of Chemicals) (REACH CSR). Although the summary is prepared based on the laws, materials, information and data that are available at the present moment, it does not provide any assurances.

### SUBSTANCE NAME

## Ethylene oxide (Ethylene oxide, CAS No. 75-21-8)

### GENERAL STATEMENT

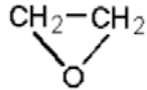
Ethylene oxide is a colorless gas with a characteristic ether odor. Ethylene oxide is used as intermediates for a wide variety of compounds since ethylene oxide is reactive. Ethylene oxide is used as sterilizer for medical equipment and precision instrument since Ethylene oxide has bactericidal properties.

Ethylene oxide is a extremely flammable gas, therefore it is important to keep away from heat, sparks, open flames or hot sources. Ethylene oxide is toxic if swallowed, toxic if inhaled, causes skin irritation, cause eye irritation, may cause allergy or asthma symptoms or breathing difficulties if inhaled, may cause an allergic skin reaction, may cause genetic defects, may cause cancer, may damage fertility or unborn child, causes damages to organs (central nervous system, lungs), may cause respiratory irritation and causes damage to organs (nervous system) through prolonged or repeated exposure. Though Ethylene oxide is harmful to aquatic life, Ethylene oxide is biodegradable and low bioaccumulative.

It is recommended to wear appropriate protective masks, gloves when sampling for manufacturing etc. To minimize the adverse effects of Ethylene oxide on environmental organisms and control its release into the environment, the sewage equipment should be monitored regularly and the sewage treatment facility should be maintained and inspected in the factory.

### CHEMICAL IDENTITY

Item	Contents
Generic name	Ethylene oxide
Trade name	Ethylene oxide
Chemical name	Ethylene oxide (IUPAC name: Oxirane)
CAS No.	75-21-8
Other numbers	Reference No. listed in the official gazettes (Act on the Evaluation of Chemical Substances and Regulation of Their Manufacture, etc., Industrial Safety and Health Act) (2)-218 EC No. 200-849-9

Molecular formula	C <sub>2</sub> H <sub>4</sub> O
Structural formula	
Other information	None in particular

## USES AND APPLICATIONS

Intended uses of our product	Intermediates for a wide variety of compounds, sterilizer for medical equipment and precision instrument
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## PHYSICAL/CHEMICAL PROPERTIES

Appearance (physical state)	Gas
Color	Colorless
Odor	Characteristic ether odor
Specific gravity (relative density)	0.891
Melting point/boiling point	-111°C/ 10.73°C
Combustibility/flammability	Extremely flammable gas (Category 1)
Flash point	None
Limit of combustion or explosion	3.6 - 100 vol %
Auto ignition temperature	429 °C
Vapor pressure	148830 Pa(20°C)
Molecular weight	44.05
Water solubility	1000 g/L(25°C)
Octanol-water partition coefficient	LogKow : -0.3

## HEALTH EFFECTS

Effect assessment	Results (GHS <sup>*1</sup> hazard classification)
Acute toxicity (oral ingestion)	Toxic if swallowed (Category 3)
Acute toxicity (inhalation)	Toxic if inhaled (gas) Classification not possible <sup>*2</sup> (vapor) Classification not possible (dust/mist)
Acute toxicity (dermal)	Classification not possible
Skin corrosion/irritation	Causes skin irritation (Category 2)
Serious eye damage/eye irritation	Causes eye irritation (Category 2B)
Respiratory sensitization	May cause allergy or asthma symptoms or breathing difficulties if inhaled (Category 1)
Skin sensitization	May cause an allergic skin reaction (Category 1)
Germ cell mutagenicity	May cause genetic defects (Category 1B)
Carcinogenicity	May cause cancer (Category 1A)
Reproductive toxicity	May damage fertility or the unborn child (Category 1)
Specific target organ toxicity (Single exposure)	Causes damage to organs (central nervous system, lungs) (Category 1) May cause respiratory irritation (Category 3)
Specific target organ toxicity (Repeated exposure)	Causes damage to organs (nervous system) through prolonged or repeated exposure (Category 1)

Aspiration hazard  
Source/remarks

Classification not possible

<sup>\*1</sup> GHS: Globally Harmonized System of Classification and Labelling of Chemicals. This system enables us to classify chemicals by hazard type and degree according to globally harmonized rules.

<sup>\*2</sup> Classification not possible: The data needed for judging classification are not available at all or sufficient data are not collected for classification.

## ENVIRONMENTAL EFFECTS

Effect assessment	Results (GHS hazard classification)
Hazardous to the aquatic environment (acute)	Harmful to aquatic life (Category 3)
Hazardous to the aquatic environment (chronic)	Classification not possible
Environmental fate/dynamics	Results
Transfer in the environment	Low volatility from water and low soil absorption
Biodegradability	Readily biodegradable
Bioaccumulation	Low bioaccumulative potential
Conclusion of PBT/vPvB	Not judged to be PBT* and vPvB**.
	*PBT: Persistent, bioaccumulative and toxic (Remaining in the environment and having high bioaccumulative and strong toxic properties)
	**vPvB: very Persistent and very Bioaccumulative (Readily remaining in the environment and having very high bioaccumulative property)

## EXPOSURE

Details	No.	Potential exposure in the process of use of our products (exposure route)
Occupational Exposure	1-1	Thorough sampling (inhalation, skin/eye contact). However Ethylene is produced in a closed process, potential for occupational exposure is extremely low.
Consumer exposure	2-1	This material is not used by consumers and therefore the potential for consumer exposure is extremely low.
Environmental exposure	3-1	Through sampling (mainly in the atmosphere) However Ethylene oxide is manufactured in a closed system process, the possibility of environment release is very low. It is gas at normal temperature and normal pressure. In the case of environmental release, though it is considered to disperse into air and water, it is expected to be degraded in water rapidly.
Note		If there is a potential for exposure in other uses, take appropriate measures in reference to the risk management recommends.

## RISK MANAGEMENT RECOMMENDATIONS

Details	No.	Management recommendations based on our risk assessment results
Occupational Exposure	1-1	Wear appropriate protective masks, clothing and gloves made of materials that ethylene does not penetrate during sampling operation. As the recommend threshold limit value, 1 ppm (TWA: time-weighted average) has been published by the ACGIH (American Conference of

Governmental Industrial Hygienists). At the production site and other sites where ethylene oxide is used, manage and control its environmental concentration so that lower than this recommended value.

The operation manager instructs workers how to select and use the appropriate protective equipment and how to manage the work place.

Consumer exposure	2-1	None
Environmental exposure	3-1	Ethylene oxide may affect environment if leaked. Take measures to prevent leakage, and take due care in daily management and handling.
Other warnings		None
Note		For the measures and actions to be taken for regular handling, emergency situations, disposal and transportation, see Section 4, 5, 6, 7, 8, 13 and 14, SDS issued by Mitsubishi Chemical Corporation.

## STATE AGENCY REVIEW

Assessment document	Review condition
OECD HPV	None
National Institute of Evaluation and Technology (NITE)	<a href="http://www.safe.nite.go.jp/risk/files/pdf_hyoukasyo/042riskdoc.pdf">http://www.safe.nite.go.jp/risk/files/pdf_hyoukasyo/042riskdoc.pdf</a>
- Preliminary Risk Assessment of Chemical Substances	
Ministry of Environment	<a href="http://www.env.go.jp/chemi/report/h15-01/pdf/chap01/02-2/03.pdf">http://www.env.go.jp/chemi/report/h15-01/pdf/chap01/02-2/03.pdf</a>
- Preliminary Environment Risk Assessment of Chemical Substances	<a href="http://www.env.go.jp/chemi/report/h15-01/pdf/chap01/03-2/02.pdf">http://www.env.go.jp/chemi/report/h15-01/pdf/chap01/03-2/02.pdf</a>
REACH	<a href="http://apps.echa.europa.eu/registered/registered-sub.aspx">http://apps.echa.europa.eu/registered/registered-sub.aspx</a>

## REGULATORY INFORMATION / LABELLING INFORMATION

### Main regulatory information

Law	Regulatory condition
UN class	2.3 (2.1)
UN No.	1040
Fire Service Act	Substances interfering with fire fighting
Ship Safety Act	Hazardous Substance List, Separate Table 1 High Pressure Gas Hazardous Substance List, Separate Table 1 Flammable Liquids
High Pressure Gas Safety Act	Article 2 of the Security Regulation for General High Pressure Gas
Poisonous and Deleterious Substances Control Act	Deleterious substance
Act on Confirmation, etc. of Release Amounts of Specific Chemical Substances in the Environment	Priority Assessment Chemical Substances

Promotion of  
Improvements to the  
Management Thereof

Pollutant Release Transfer Register Specified Class 1 Substances

Industrial Safety and  
Health Act

Enforcement Order, Appended Table 1, Dangerous Substances (4)  
Inflammable Substances

Article 57 Labeled substance

Article 57-2 Paragraph 2 Substance Requiring notification

Civil Aeronautics Act

Substances Approved for Transportation, 2.1 Flammable gas

Labelling information

Pictograms or symbols



Signal Word

Danger

Hazard statement

- Extremely flammable gas
- Contains gas under pressure; may explode if heated
- Toxic if swallowed
- Toxic if inhaled
- Causes skin irritation
- Cause eye irritation
- May cause allergy or asthma symptoms or breathing difficulties if inhaled,
- May cause an allergic skin reaction
- May cause genetic defects
- May cause cancer
- May damage fertility or unborn child
- Causes damages to organs (central nervous system, lungs)
- May cause respiratory irritation
- Causes damage to organs (nervous system) through prolonged or repeated exposure
- Harmful to aquatic life

### CONTACT INFORMATION WITHIN COMPANY

Company	Mitsubishi Chemical Corporation
Address	1-1 Marunouchi 1-chome, Chiyoda-ku, Tokyo
Department/person in charge	Ethylene Oxide/Glycols and Ethanol Department
TEL/FAX	+82-3-6748-7176, +82-3-3286-1275

### DATE OF ISSUE / REVISION, ADDITIONAL INFORMATION

Ver. 1 : Issued on march 26, 2014 (JP revised version 1: issued on July 30, 2012)

Revised : None

Special remarks: None