SAFETY DATA SHEET

Ethylene

Version 3.5 Revision Date 2024.01.28 Print Date 2024.02.05

1. PRODUCT AND COMPANY IDENTIFICATION

Chemical product name : Ethylene

Product code : X2111, X2112, X2270, X2273, Q9248, E7000

CAS-No. : 74-85-1

ENCS/ISHL number : 2-12 (CAS: 74-85-1)

Manufacturer or supplier's details

Supplier's company name, address and phone number :
SHELL EASTERN CHEMICALS (S)
A REGISTERED BUSINESS OF SHELL EASTERN TRADING (PTE) LTD (UEN:198902087C)
9 North Buona Vista Drive , #07-01
The Metropolis Tower 1
Singapore 138588
Singapore

Telephone : +65 6384 8269
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Contact for Safety Data Sheet :

Emergency telephone number : +65 6542 9595 (Alert SGS)

Recommended use of the chemical and restrictions on use

Recommended use : Base chemical., Raw material for use in the chemical industry.

Restrictions on use : This product must not be used in applications other than the above without first seeking the advice of the supplier.

2. HAZARDS IDENTIFICATION

GHS classification of chemical product

Flammable gases : Category 1A
Gases under pressure : Compressed gas
Specific target organ toxicity - single exposure : Category 3

GHS label elements

Hazard pictograms :

Signal word : Danger

Hazard statements : PHYSICAL HAZARDS:

H220 Extremely flammable gas.
H280 Contains gas under pressure; may explode if heated.
HEALTH HAZARDS:
H336 May cause drowsiness or dizziness.
ENVIRONMENTAL HAZARDS:
Not classified as an environmental hazard under GHS criteria.

Precautionary statements :

Prevention:
P210 Keep away from heat/ sparks/ open flames/ hot surfaces. No smoking.
P243 Take precautionary measures against static discharge.
P261 Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray.
P271 Use only outdoors or in a well-ventilated area.

Response:
P377 Leaking gas fire: Do not extinguish, unless leak can be stopped safely.
P381 Eliminate all ignition sources if safe to do so.
P304 + P340 IF INHALED: Remove person to fresh air and keep comfortable for breathing.
P312 Call a POISON CENTER/ doctor if you feel unwell.

Storage:
P403 + P233 Store in a well-ventilated place. Keep container tightly closed.
P405 Store locked up.
P410 Protect from sunlight.

Disposal:
P501 Dispose of contents/ container to an approved waste disposal plant.

Other hazards which do not result in classification

May form flammable/explosive vapour-air mixture.This material is a static accumulator.Even with proper grounding and bonding, this material can still accumulate an electrostatic charge.If sufficient charge is allowed to accumulate, electrostatic discharge and ignition of flammable air-vapour mixtures can occur.This material is shipped under pressure.High gas concentrations will displace available air; unconsciousness and death may occur suddenly from lack of oxygen.Rapid release of gases which are liquids under pressure may cause frost burns of exposed tissues (skin, eye) due to evaporative cooling.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Substance / Mixture : Substance

Hazardous components

Substance name	CAS-No.	Classification	Concentration (% w/w)

ethylene	74-85-1	Flam. Gas1A; H220 Press. GasCompr. Gas; H280 STOT SE3; H336	>= 99.9

For explanation of abbreviations see section 16.

4. FIRST-AID MEASURES

General advice : Not expected to be a health hazard when used under normal conditions.

If inhaled : Remove to fresh air. If rapid recovery does not occur, transport to nearest medical facility for additional treatment.

In case of skin contact : Slowly warm the exposed area by rinsing with warm water. Transport to the nearest medical facility for additional treatment.

In case of eye contact : Slowly warm the exposed area by rinsing with warm water. Transport to the nearest medical facility for additional treatment.

If swallowed : In general no treatment is necessary unless large quantities are swallowed, however, get medical advice.

Most important symptoms and effects, both acute and delayed : Breathing of high vapour concentrations may cause central nervous system (CNS) depression resulting in dizziness, light-headedness, headache, nausea and loss of coordination. Continued inhalation may result in unconsciousness and death.

Rapid release of gases which are liquids under pressure may cause frost burns of exposed tissues (skin, eye) due to evaporative cooling.

No specific hazards under normal use conditions.
Ingestion may result in nausea, vomiting and/or diarrhoea.

Protection of first-aiders : When administering first aid, ensure that you are wearing the appropriate personal protective equipment according to the incident, injury and surroundings.

Notes to physician : IMMEDIATE TREATMENT IS EXTREMELY IMPORTANT!
Call a doctor or poison control center for guidance.
Treat symptomatically.
Potential for cardiac sensitisation, particularly in abuse situations. Hypoxia or negative inotropes may enhance these effects. Consider: oxygen therapy.

5. FIRE-FIGHTING MEASURES

Suitable extinguishing media	:	Shut off supply. If not possible and no risk to surroundings, let the fire burn itself out.
Unsuitable extinguishing media	:	Data not available
Specific hazards during firefighting	:	Sustained fire attack on vessels may result in a Boiling Liquid Expanding Vapor Explosion (BLEVE). Contents are under pressure and can explode when exposed to heat or flames. As the vapours become lighter than air, the vapours may reach ignition sources at ground or elevated locations.
Specific extinguishing methods	:	Standard procedure for chemical fires. Clear fire area of all non-emergency personnel. Keep adjacent containers cool by spraying with water.
Special protective equipment for firefighters	:	Proper protective equipment including chemical resistant gloves are to be worn; chemical resistant suit is indicated if large contact with spilled product is expected. Self-Contained Breathing Apparatus must be worn when approaching a fire in a confined space. Select fire fighter's clothing approved to relevant Standards (e.g. Europe: EN469).

6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures	:	Observe the relevant local and international regulations Notify authorities if any exposure to the general public or the environment occurs or is likely to occur. Local authorities should be advised if significant spillages cannot be contained.
	:	Avoid contact with skin, eyes and clothing. Isolate hazard area and deny entry to unnecessary or unprotected personnel. Do not breathe fumes, vapour. Do not operate electrical equipment.
Environmental precautions	:	Shut off leaks, if possible without personal risks. Remove all possible sources of ignition in the surrounding area and evacuate all personnel. Attempt to disperse the gas or to direct its flow to a safe location for example by using fog sprays. Take precautionary measures against static discharge. Ensure electrical continuity by bonding and grounding (earthing) all equipment. Monitor area with combustible gas meter.
Methods and materials for	:	Allow to evaporate.

containment and cleaning up		Attempt to disperse the vapour or to direct its flow to a safe location, for example by using fog sprays. Otherwise treat as for small spillage.
Additional advice	:	For guidance on selection of personal protective equipment see Section 8 of this Safety Data Sheet. Vapour may form an explosive mixture with air. For guidance on disposal of spilled material see Section 13 of this Safety Data Sheet.

7. HANDLING AND STORAGE

Handling

Technical measures	:	Avoid breathing of or direct contact with material. Only use in well ventilated areas. Wash thoroughly after handling. For guidance on selection of personal protective equipment see Section 8 of this Safety Data Sheet. Use the information in this data sheet as input to a risk assessment of local circumstances to help determine appropriate controls for safe handling, storage and disposal of this material.
Advice on safe handling	:	This product is intended for use in closed systems only. Extinguish any naked flames. Do not smoke. Remove ignition sources. Avoid sparks. Avoid inhaling vapour and/or mists. Avoid contact with skin, eyes and clothing. Use local exhaust ventilation if there is risk of inhalation of vapours, mists or aerosols. Bulk storage tanks should be diked (bunded). Properly dispose of any contaminated rags or cleaning materials in order to prevent fires. Even with proper grounding and bonding, this material can still accumulate an electrostatic charge. If sufficient charge is allowed to accumulate, electrostatic discharge and ignition of flammable air-vapour mixtures can occur. Be aware of handling operations that may give rise to additional hazards that result from the accumulation of static charges. These include but are not limited to pumping (especially turbulent flow), mixing, filtering, splash filling, cleaning and filling of tanks and containers, sampling, switch loading, gauging, vacuum truck operations, and mechanical movements. These activities may lead to static discharge e.g. spark formation. Restrict line velocity during pumping in order to avoid generation of electrostatic discharge (≤ 1 m/s until fill pipe submerged to twice its diameter, then ≤ 7 m/s). Avoid splash filling. Do NOT use compressed air for filling, discharging, or

handling operations.

Facial protective equipment : Wear safety glasses and face shield (preferably with a chin guard) if splashes are likely to occur.

Hygiene measures : Wash hands before eating, drinking, smoking and using the toilet.
Launder contaminated clothing before re-use.

Describe contact avoidance, etc : Strong oxidising agents.
Hydrochloric acid, hydrogen bromide and nitrogen oxides.

Product Transfer : Refer to guidance under Handling section.

Storage

Other data : Vapours from tanks should not be released to atmosphere.
Breathing losses during storage should be controlled by a suitable vapour treatment system.
Electrostatic charges will be generated during pumping. Electrostatic discharge may cause fire. Ensure electrical continuity by bonding and grounding (earthing) all equipment to reduce the risk.
The vapours in the head space of the storage vessel may lie in the flammable/explosive range and hence may be flammable.
Must be stored in a diked (bunded) well- ventilated area, away from sunlight, ignition sources and other sources of heat.
Keep away from aerosols, flammables, oxidizing agents, corrosives and from products harmful or toxic to man or to the environment.

Packaging material : Suitable material: For containers, or container linings use mild steel, stainless steel.

Specific use(s) : Not applicable

Ensure that all local regulations regarding handling and storage facilities are followed.
See additional references that provide safe handling practices for liquids that are determined to be static accumulators: American Petroleum Institute 2003 (Protection Against Ignitions Arising out of Static, Lightning and Stray Currents) or National Fire Protection Agency 77 (Recommended Practices on Static Electricity).
IEC/TS 60079-32-1: Electrostatic hazards, guidance

8. EXPOSURE CONTROLS AND PERSONAL PROTECTION

Threshold limit value and permissible exposure limits for each component in the work environment

Components	CAS-No.	Value type	Control	Basis

		(Form of exposure)	parameters / Permissible concentration	
ethylene	74-85-1	TWA	200 ppm	ACGIH

Biological occupational exposure limits

No biological limit allocated.

Monitoring Methods

Monitoring of the concentration of substances in the breathing zone of workers or in the general workplace may be required to confirm compliance with an OEL and adequacy of exposure controls. For some substances biological monitoring may also be appropriate.
Validated exposure measurement methods should be applied by a competent person and samples analysed by an accredited laboratory.
Examples of sources of recommended exposure measurement methods are given below or contact the supplier. Further national methods may be available.
National Institute of Occupational Safety and Health (NIOSH), USA: Manual of Analytical Methods http://www.cdc.gov/niosh/
Occupational Safety and Health Administration (OSHA), USA: Sampling and Analytical Methods http://www.osha.gov/
Health and Safety Executive (HSE), UK: Methods for the Determination of Hazardous Substances http://www.hse.gov.uk/
Institut für Arbeitsschutz Deutschen Gesetzlichen Unfallversicherung (IFA) , Germany http://www.dguv.de/inhalt/index.jsp
L'Institut National de Recherche et de Securité, (INRS), France http://www.inrs.fr/accueil

労働者の健康障害を防止するため化学物質の濃度基準値とその適用方法などを定めました (mhlw.go.jp)

Engineering measures : Use sealed systems as far as possible.
Adequate explosion-proof ventilation to control airborne concentrations below the exposure guidelines/limits.
Local exhaust ventilation is recommended.
Always observe good personal hygiene measures, such as washing hands after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants. Discard contaminated clothing and footwear that cannot be cleaned.
Practice good housekeeping.
Define procedures for safe handling and maintenance of controls.
Educate and train workers in the hazards and control measures relevant to normal activities associated with this product.
Ensure appropriate selection, testing and maintenance of equipment used to control exposure, e.g. personal protective equipment, local exhaust ventilation.
Drain down system prior to equipment break-in or maintenance.
Retain drain downs in sealed storage pending disposal or for subsequent recycle.
The level of protection and types of controls necessary will

vary depending upon potential exposure conditions. Select controls based on a risk assessment of local circumstances. Appropriate measures include:

Personal protective equipment

Protective measures

Personal protective equipment (PPE) should meet recommended national standards. Check with PPE suppliers.

Respiratory protection	:	If engineering controls do not maintain airborne concentrations to a level which is adequate to protect worker health, select respiratory protection equipment suitable for the specific conditions of use and meeting relevant legislation. Check with respiratory protective equipment suppliers. Where air-filtering respirators are unsuitable (e.g. airborne concentrations are high, risk of oxygen deficiency, confined space) use appropriate positive pressure breathing apparatus. Where respiratory protective equipment is required, use a full-face mask. If air-filtering respirators are suitable for conditions of use: Select a filter suitable for combined particulate/organic gases and vapours [boiling point <65 °C (149 °F)]
Hand protection Remarks	:	If contact with liquefied product is possible or anticipated, gloves should be thermally insulated to prevent cold burns. Where hand contact with the product may occur the use of gloves approved to relevant standards (e.g. Europe: EN374, US: F739) made from the following materials may provide suitable chemical protection. Neoprene rubber. For continuous contact we recommend gloves with breakthrough time of more than 240 minutes with preference for > 480 minutes where suitable gloves can be identified. For short-term/splash protection we recommend the same but recognize that suitable gloves offering this level of protection may not be available and in this case a lower breakthrough time maybe acceptable so long as appropriate maintenance and replacement regimes are followed. Glove thickness is not a good predictor of glove resistance to a chemical as it is dependent on the exact composition of the glove material. Suitability and durability of a glove is dependent on usage, e.g. frequency and duration of contact, chemical resistance of glove material, dexterity. Always seek advice from glove suppliers. Contaminated gloves should be replaced. Personal hygiene is a key element of effective hand care. Gloves must only be worn on clean hands. After using gloves, hands should be washed and dried thoroughly. Application of a non-perfumed moisturizer is recommended.
Eye and face protection	:	Wear safety glasses and face shield (preferably with a chin guard) if splashes are likely to occur.

Skin and body protection	:	Chemical and cryogenic gloves/gauntlets, boots, and apron. Wear antistatic and flame-retardant clothing, if a local risk assessment deems it so.
Thermal hazards	:	When handling cold material that can cause frost burns, wear cryogenic gloves, safety hat and visor, cold resistant overalls (with cuffs over gloves and legs over boots) and heavy duty boots e.g. leather for cold resistance.
Hygiene measures	:	Wash hands before eating, drinking, smoking and using the toilet. Launder contaminated clothing before re-use.

Environmental exposure controls

General advice	:	Local guidelines on emission limits for volatile substances must be observed for the discharge of exhaust air containing vapour. Information on accidental release measures are to be found in section 6.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical state	:	Gas at Standard Temperature and Pressure.
Colour	:	colourless
Odour	:	Data not available
Odour Threshold	:	270 - 600 ppm
pH	:	Not applicable
Melting point/freezing point	:	-169.2 °C / -272.6 °F
Boiling point, initial boiling point and boiling range	:	-103.7 °C / -154.7 °F
Flash point	:	-136 °C / -213 °F Method: No information available.
Evaporation rate	:	Data not available

Flammability

Flammability (solid, gas)	:	Flammable gas.

Lower explosion limit and upper explosion limit / flammability limit

Upper explosion limit	:	36 %(V)
Lower explosion limit	:	2.7 %(V)

Vapour pressure	:	4,275 kPa (1.9 °C / 35.4 °F)
Relative vapour density	:	0.975 (0 °C / 32 °F)
Density and / or relative density		
Relative density	:	0.568 (-104 °C / -155 °F) Method: ASTM D4052
Density	:	568 kg/m3 (-104 °C / -155 °F) Method: ASTM D4052
Solubility(ies)		
Water solubility	:	131 mg/l (25 °C / 77 °F)
Partition coefficient: n-octanol/water	:	log Pow: 1.13 Method: Literature data.
Auto-ignition point	:	450 °C / 842 °F
Decomposition temperature	:	Data not available
Viscosity		
Viscosity (Dynamic)	:	Data not available
Viscosity, kinematic	:	Data not available
Explosive properties	:	no data available
Oxidizing properties	:	Data not available
Surface tension	:	Data not available
Conductivity	:	Low conductivity: < 100 pS/m, The conductivity of this material makes it a static accumulator., A liquid is typically considered nonconductive if its conductivity is below 100 pS/m and is considered semi-conductive if its conductivity is below 10,000 pS/m., Whether a liquid is nonconductive or semi-conductive, the precautions are the same., A number of factors, for example liquid temperature, presence of contaminants, and anti-static additives can greatly influence the conductivity of a liquid
Particle characteristics		
Particle size	:	Data not available
Molecular weight	:	28 g/mol

10. STABILITY AND REACTIVITY

Reactivity	:	The product does not pose any further reactivity hazards in addition to those listed in the following sub-paragraph.
Chemical stability	:	No hazardous reaction is expected when handled and stored according to provisions Reacts violently with strong oxidising agents. Reacts violently with hydrochloric acid, hydrogen bromide and nitrogen oxides.
Possibility of hazardous reactions	:	Polymerisation may occur at elevated temperatures.
Conditions to avoid	:	Heat, flames, and sparks. Exposure to air. In certain circumstances product can ignite due to static electricity.
Incompatible materials	:	Strong oxidising agents. Hydrochloric acid, hydrogen bromide and nitrogen oxides.
Hazardous decomposition products	:	Thermal decomposition is highly dependent on conditions. A complex mixture of airborne solids, liquids and gases including carbon monoxide, carbon dioxide, sulphur oxides and unidentified organic compounds will be evolved when this material undergoes combustion or thermal or oxidative degradation.

11. TOXICOLOGICAL INFORMATION

Basis for assessment	:	Information given is based on product testing. Unless indicated otherwise, the data presented is representative of the product as a whole, rather than for individual component(s).
Information on likely routes of exposure	:	Inhalation is the primary route of exposure.

Acute toxicity

Components:

ethylene:

Acute inhalation toxicity	:	LC 50 Rat, male: > 20000 ppm Exposure time: 4 h Test atmosphere: gas Method: Literature data Remarks: Based on available data, the classification criteria are not met. High gas concentrations will displace available air; unconsciousness and death may occur suddenly from lack of oxygen.

Skin corrosion/irritation

Components:

ethylene:
Remarks: Rapid release of gases which are liquids under pressure may cause frost burns of exposed tissues (skin, eye) due to evaporative cooling.

Serious eye damage/eye irritation

Components:

ethylene:
Remarks: Rapid release of gases which are liquids under pressure may cause frost burns of exposed tissues (skin, eye) due to evaporative cooling.

Respiratory or skin sensitisation

no data available

Germ cell mutagenicity

Components:

ethylene:

Genotoxicity in vitro	:	Method: Test(s) equivalent or similar to OECD Guideline 471 Remarks: Based on available data, the classification criteria are not met.
	:	Method: OECD Test Guideline 473 Remarks: Based on available data, the classification criteria are not met.
	:	Test species: RatMethod: Test(s) equivalent or similar to OECD Test Guideline 474 Remarks: Based on available data, the classification criteria are not met.
Germ cell mutagenicity-Assessment	:	This product does not meet the criteria for classification in categories 1A/1B.

Carcinogenicity

Components:

ethylene:
Species: Rat, (male and female)
Application Route: Inhalation
Method: Test(s) equivalent or similar to OECD Test Guideline 453
Remarks: Based on available data, the classification criteria are not met.

Carcinogenicity - Assessment	:	This product does not meet the criteria for classification in categories 1A/1B.

Material	GHS/CLP Carcinogenicity Classification
ethylene	No carcinogenicity classification.

Material	Other Carcinogenicity Classification
ethylene	IARC: Group 3: Not classifiable as to its carcinogenicity to humans

Reproductive toxicity

Components:

ethylene:

: Species: Rat
Sex: male and female
Application Route: Inhalation

Method: OECD Test Guideline 421
Remarks: Based on available data, the classification criteria are not met.

Effects on foetal development : Species: Rat, male and female
Application Route: Inhalation
Method: OECD Test Guideline 421
Remarks: Based on available data, the classification criteria are not met.

Reproductive toxicity - Assessment : This product does not meet the criteria for classification in categories 1A/1B.

STOT - single exposure

Components:

ethylene:
Remarks: May cause drowsiness or dizziness., High concentrations may cause central nervous system depression resulting in headaches, dizziness and nausea.

STOT - repeated exposure

Components:

ethylene:
Remarks: Based on available data, the classification criteria are not met.

Repeated dose toxicity

Components:

ethylene:

Rat, male and female:
Application Route: Inhalation
Test atmosphere: Gas
Method: OECD Test Guideline 413
Target Organs: No specific target organs noted

Symptoms: Strain-dependent, Subacute rhinitis, Nasal lesions
Remarks: Treatment-related but slight and not considered adverse.

Aspiration toxicity

Components:
ethylene:
Based on available data, the classification criteria are not met.

Further information

Components:
ethylene:
Remarks: Classifications by other authorities under varying regulatory frameworks may exist.

12. ECOLOGICAL INFORMATION

Basis for assessment	:	Incomplete ecotoxicological data are available for this product. The information given below is based partly on a knowledge of the components and the ecotoxicology of similar products. Unless indicated otherwise, the data presented is representative of the product as a whole, rather than for individual component(s).

Ecotoxicity

Components:
ethylene :

Toxicity to fish (Acute toxicity)	:	LC50 : 126.012 mg/l Exposure time: 96 h Method: Based on quantitative structure-activity relationship (QSAR) modelling Remarks: Practically non toxic: LL/EL/IL50 > 100 mg/l
Toxicity to crustacean (Acute toxicity)	:	Remarks: Practically non toxic: LL/EL/IL50 > 100 mg/l
Toxicity to algae/aquatic plants (Acute toxicity)	:	Remarks: Practically non toxic: LL/EL/IL50 > 100 mg/l
Toxicity to microorganisms (Acute toxicity)	:	Remarks: Data not available
Toxicity to fish (Chronic toxicity)	:	Remarks: Data not available
Toxicity to crustacean(Chronic toxicity)	:	Remarks: Data not available

Persistence and degradability

Components:

ethylene :

Biodegradability	:	Biodegradation: 50 % Exposure time: 2.9 d Method: Based on quantitative structure-activity relationship (QSAR) modelling Remarks: Readily biodegradable.

Bioaccumulation

Product:

Partition coefficient: n-octanol/water	:	log Pow: 1.13Method: Literature data.

Components:
ethylene :

Bioaccumulation	:	Remarks: Does not bioaccumulate significantly.

Mobility in soil

Components:
ethylene :

Mobility	:	Remarks: Because of their extreme volatility, air is the only environmental compartment that hydrocarbon gases will be found.

Other adverse effects

Product:

Results of PBT and vPvB assessment	:	The substance does not fulfill all screening criteria for persistence, bioaccumulation and toxicity and hence is not considered to be PBT or vPvB.

Components:
ethylene :

Results of PBT and vPvB assessment	:	The substance does not fulfill all screening criteria for persistence, bioaccumulation and toxicity and hence is not considered to be PBT or vPvB.
Additional ecological information	:	In view of the high rate of loss from solution, the product is unlikely to pose a significant hazard to aquatic life.

Hazardous to the ozone layer

Not applicable

13. DISPOSAL CONSIDERATIONS

Disposal methods

Chemicals (residual waste)	:	Recover or recycle if possible. It is the responsibility of the waste generator to determine the toxicity and physical properties of the material generated to determine the proper waste classification and disposal methods in compliance with applicable regulations. Do not dispose into the environment, in drains or in water courses.

Waste product should not be allowed to contaminate soil or water.

Local regulations may be more stringent than regional or national requirements and must be complied with.

Contaminated containers and packaging : Disposal should be in accordance with applicable regional, national, and local laws and regulations.

14. TRANSPORT INFORMATION

Regulatory information when there are domestic regulations

Refer to section 15 for specific national regulation.

International Regulations

ADR

UN number	:	1038
Product Name (Proper shipping name)	:	ETHYLENE, REFRIGERATED LIQUID
Class (Hazard class in transportation)	:	2
Packing group	:	Not Assigned
Labels	:	2.1
Hazard Identification Number	:	223
Environmentally hazardous	:	no

IATA-DGR

UN/ID No.	:	UN 1038 (Not permitted for transport)
Product Name (Proper shipping name)	:	ETHYLENE, REFRIGERATED LIQUID
Class (Hazard class in transportation)	:	2.1
Packing group	:	Not Assigned
Labels	:	2.1

IMDG-Code

UN number	:	UN 1038
Product Name (Proper shipping name)	:	ETHYLENE, REFRIGERATED LIQUID
Class (Hazard class in transportation)	:	2.1
Packing group	:	Not Assigned
Labels	:	2.1
Marine pollutant	:	no

Maritime transport in bulk according to IMO instruments

Ship type	:	2G
Product name	:	ETHYLENE

Special precautions for user

Remarks	:	Special Precautions: Refer to Section 7, Handling & Storage, for special precautions which a user needs to be aware of or needs to comply with in connection with transport.
Additional Information	**:**	Transport in bulk according to the IGC code This product may be transported under nitrogen blanketing. Nitrogen is an odourless and invisible gas. Exposure to nitrogen enriched atmospheres displaces available oxygen which may cause asphyxiation or death. Personnel must observe strict safety precautions when involved with a confined space entry.

15. REGULATORY INFORMATION

Related Regulations

Fire Service Law

Not applicable

Industrial Safety and Health Law

Substances Subject to be Indicated Names

Not applicable

Substances Subject to be Notified Names

Not applicable

Harmful Substances Required Permission for Manufacture

Not applicable

Ordinance on Prevention of Hazards Due to Specified Chemical Substances

Not applicable

Ordinance on Prevention of Organic Solvent Poisoning

Not applicable

Enforcement Order of the Industrial Safety and Health Law - Attached table 1 (Dangerous Substances)

Flammable gas

Poisonous and Deleterious Substances Control Law

Not applicable

Act on Confirmation, etc. of Release Amounts of Specific Chemical Substances in the Environment and Promotion of Improvements to the Management Thereof

Not applicable

Vessel Safety Law

Gases (Article 2 and 3 of rules on shipping and storage of dangerous goods and its Attached Table 1)

High Pressure Gas Safety Act

Flammable Gas

Aviation Law

Gases (Article 194 of The Enforcement Rules of Aviation Law and its Attached Table 1)

Marine Pollution and Sea Disaster Prevention etc Law

Bulk transportation : Not classified as marine pollutant

The components of this product are reported in the following inventories:

AIIC : Listed

DSL : Listed

IECSC : Listed

ENCS : Listed

KECI : Listed

NZIoC : Listed

PICCS : Listed

TCSI : Listed

TSCA : Listed

16. OTHER INFORMATION

Full text of H-Statements

H220	Extremely flammable gas.
H280	Contains gas under pressure; may explode if heated.
H336	May cause drowsiness or dizziness.

Full text of other abbreviations

Flam. Gas	Flammable gases
Press. Gas	Gases under pressure
STOT SE	Specific target organ toxicity - single exposure

Abbreviations and Acronyms

AIIC - Australian Inventory of Industrial Chemicals; ANTT - National Agency for Transport by Land of Brazil; ASTM - American Society for the Testing of Materials; bw - Body weight; CMR - Carcinogen, Mutagen or Reproductive Toxicant; DIN - Standard of the German Institute for Standardisation; DSL - Domestic Substances List (Canada); ECx - Concentration associated with x% response; ELx - Loading rate associated with x% response; EmS - Emergency Schedule; ENCS - Existing and New Chemical Substances (Japan); ErCx - Concentration associated with x% growth rate response; ERG - Emergency Response Guide; GHS - Globally Harmonized System; GLP - Good Laboratory Practice; IARC - International Agency for Research on Cancer; IATA - International Air Transport Association; IBC - International Code for the Construction and Equipment of Ships carrying Dangerous Chemicals in Bulk; IC50 - Half maximal inhibitory concentration; ICAO - International Civil Aviation Organization; IECSC - Inventory of Existing Chemical Substances in China; IMDG - International Maritime Dangerous Goods; IMO - International Maritime Organization; ISHL - Industrial Safety and Health Law (Japan); ISO - International Organisation for Standardization; KECI - Korea Existing Chemicals Inventory; LC50 - Lethal Concentration to 50 % of a test population; LD50 - Lethal Dose to 50% of a test population

(Median Lethal Dose); MARPOL - International Convention for the Prevention of Pollution from Ships; n.o.s. - Not Otherwise Specified; Nch - Chilean Norm; NO(A)EC - No Observed (Adverse) Effect Concentration; NO(A)EL - No Observed (Adverse) Effect Level; NOELR - No Observable Effect Loading Rate; NOM - Official Mexican Norm; NTP - National Toxicology Program; NZIoC - New Zealand Inventory of Chemicals; OECD - Organization for Economic Co-operation and Development; OPPTS - Office of Chemical Safety and Pollution Prevention; PBT - Persistent, Bioaccumulative and Toxic substance; PICCS - Philippines Inventory of Chemicals and Chemical Substances; (Q)SAR - (Quantitative) Structure Activity Relationship; REACH - Regulation (EC) No 1907/2006 of the European Parliament and of the Council concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals; SADT - Self-Accelerating Decomposition Temperature; SDS - Safety Data Sheet; TCSI - Taiwan Chemical Substance Inventory; TDG - Transportation of Dangerous Goods; TECI - Thailand Existing Chemicals Inventory; TSCA - Toxic Substances Control Act (United States); UN - United Nations; UNRTDG - United Nations Recommendations on the Transport of Dangerous Goods; vPvB - Very Persistent and Very Bioaccumulative; WHMIS - Workplace Hazardous Materials Information System

Further information

Training advice	:	Provide adequate information, instruction and training for operators.
Other information	:	A vertical bar (|) in the left margin indicates an amendment from the previous version.
Sources of key data used to compile the Safety Data Sheet	:	The quoted data are from, but not limited to, one or more sources of information (e.g. toxicological data from Shell Health Services, material suppliers' data, CONCAWE, EU IUCLID date base, EC 1272 regulation, etc).

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