

# 12. Ethylene



Shell Chemicals

Ethylene  
Version 1.2

Effective Date 13.07.2003

## Material Safety Data Sheet

according to EC directive 2001/58/EC

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

**Material Name** : Ethylene  
**Uses** : Raw material for use in the chemical industry. Base chemical.  
**Product Code** : X2111, X2270, X2273, X2112

**Manufacturer/Supplier** : Shell Chemicals Europe B.V.  
PO Box 8610  
3009 AP Rotterdam  
Netherlands

**Telephone** : +31 (0)10 231 7000  
**Fax** : +31 (0)10 231 7180

**Emergency Telephone Number** : +31 (0)10 431 3233

### 2. COMPOSITION/INFORMATION ON INGREDIENTS

**Material Formal Name** : Ethene  
**Synonyms** : Ethene  
**CAS No.** : 74-85-1  
**INDEX No.** : 601-010-00-3  
**EINECS No.** : 200-815-3

#### Hazardous Components

Chemical Name	CAS	EINECS	Symbol(s)	R-phrase(s)	Conc.
Ethylene	74-85-1	200-815-3	F+	R12	> 99.90 %

### 3. HAZARDS IDENTIFICATION

**Health Hazards** : High gas concentrations will displace available oxygen from the air; unconsciousness and death may occur suddenly from lack of oxygen. Vapours may cause drowsiness and dizziness. Exposure to rapidly expanding gases may cause frost burns to eyes and/or skin.

**Signs and Symptoms** : Central nervous system (CNS): may cause tremors and convulsions. Other signs and symptoms of central nervous system (CNS) depression may include headache, nausea, and lack of coordination.

**Safety Hazards** : Electrostatic charges may be generated during pumping. Electrostatic discharge may cause fire. This material is shipped under pressure. Flammable gas. May form flammable/explosive vapour-air mixture.

**Environmental Hazards** : Harmful to aquatic organisms. May cause long-term adverse effects in the aquatic environment.

**Additional Information** : Not classified as dangerous under EC criteria.

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**4. FIRST AID MEASURES**

- Inhalation** : Remove to fresh air. Do not attempt to rescue the victim unless proper respiratory protection is worn. If the victim has difficulty breathing or tightness of the chest, is dizzy, vomiting, or unresponsive, give 100% oxygen with rescue breathing or CPR as required and transport to the nearest medical facility.
- Skin Contact** : Slowly warm the exposed area by rinsing with warm water. Transport to the nearest medical facility for additional treatment.
- Eye Contact** : Slowly warm the exposed area by rinsing with warm water. Transport to the nearest medical facility for additional treatment.
- Ingestion** : In the unlikely event of ingestion, obtain medical attention immediately.

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**5. FIRE FIGHTING MEASURES**

Clear fire area of all non-emergency personnel.

- Specific Hazards** : Sustained fire attack on vessels may result in a Boiling Liquid Expanding Vapour Explosion (BLEVE).
- Extinguishing Media** : Shut off supply. If not possible and no risk to surroundings, let the fire burn itself out.
- Protective Equipment for Firefighters** : Wear full protective clothing and self-contained breathing apparatus.
- Additional Advice** : Keep adjacent containers cool by spraying with water.

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**6. ACCIDENTAL RELEASE MEASURES**

Observe all relevant local and international regulations.

- Protective measures** : Avoid contact with spilled or released material. Immediately remove all contaminated clothing. For guidance on selection of personal protective equipment see Chapter 8 of this Material Safety Data Sheet. For guidance on disposal of spilled material see Chapter 13 of this Material Safety Data Sheet. Be ready for fire or possible exposure. Stay upwind and keep out of low areas. 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.
- Clean Up Methods** : Allow to evaporate. 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** : Vapour may form an explosive mixture with air. Local authorities should be advised if significant spillages cannot be contained.



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**7. HANDLING AND STORAGE**

- General Precautions** : Avoid breathing of or contact with material. Only use in well ventilated areas. Wash thoroughly after handling. For guidance on selection of personal protective equipment see Chapter 8 of this Material Safety Data Sheet.
- Handling** : Avoid inhaling vapour and/or mists. Avoid contact with skin, eyes, and clothing. Electrostatic charges may be generated during pumping. Electrostatic discharge may cause fire. Ensure electrical continuity by bonding and grounding (earthing) all equipment. Restrict line velocity during pumping in order to avoid generation of electrostatic discharge. Extinguish any naked flames. Do Not smoke. Remove ignition sources. Avoid sparks.
- Storage** : Keep away from aerosols, flammables, oxidizing agents, corrosives and from products harmful or toxic to man or to the environment. Must be stored in a diked (bunded) well-ventilated area, away from sunlight, ignition sources and other sources of heat. Vapours from tanks should not be released to atmosphere. Breathing losses during storage should be controlled by a suitable vapour treatment system.
- Product Transfer** : Electrostatic charges may be generated during pumping. Electrostatic discharge may cause fire. Ensure electrical continuity by bonding and grounding (earthing) all equipment. Restrict line velocity during pumping in order to avoid generation of electrostatic discharge. Do not use compressed air for filling, discharging or handling.
- Recommended Materials** : For containers, or container linings use mild steel, stainless steel.
- Container Advice** : Containers, even those that have been emptied, can contain explosive vapours. Do not cut, drill, grind, weld or perform similar operations on or near containers.
- Additional Information** : This product is intended for use in closed systems only.

**8. EXPOSURE CONTROLS/PERSONAL PROTECTION**

**Occupational Exposure Limits**

Material	Source	Type	ppm	mg/m3	Notation
Ethylene	ACGIH				Included in Regulatory List but with no data values - see Full Text of Regulation for further details

<b>Material</b> Ethylene	<b>Source</b> ACGIH	<b>Hazard Designation</b> Not classifiable as a human carcinogen. Simple asphyxiant.
	ACGIH	



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- Exposure Controls** : 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: Adequate explosion-proof ventilation to control airborne concentrations below the exposure guidelines/limits. Local exhaust ventilation is recommended.
- Personal Protective Equipment** : 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)] meeting EN371.
- Hand Protection** : 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. Suitability and durability of a glove is dependent on usage, e.g. frequency and duration of contact, chemical resistance of glove material, glove thickness, dexterity. Always seek advice from glove suppliers. Contaminated gloves should be replaced.
- Eye Protection** : Chemical splash goggles (chemical monogoggles).
- Protective Clothing** : Chemical resistant gloves/gauntlets, boots, and apron. Where risk of splashing or in spillage clean up, use chemical resistant one-piece overall with integral hood and chemical resistant gloves. Otherwise use chemical resistant apron and gauntlets.
- 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. Examples of sources of recommended air monitoring methods are given below or contact 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/nmam/nmammenu.html> Occupational Safety and Health Administration (OSHA), USA: Sampling and Analytical Methods  
<http://www.osha-slc.gov/dts/sltc/methods/toc.html> Health and Safety Executive (HSE), UK: Methods for the Determination of Hazardous Substances <http://www.hsl.gov.uk/search.htm> Berufsgenossenschaftliches Institut für Arbeitssicherheit (BIA), Germany <http://www.hvbg.de/d/bia/pub/grl/grle.htm> L'Institut National de Recherche et de Sécurité, (INRS), France <http://www.inrs.fr/indexnosdoss.html>



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**9. PHYSICAL AND CHEMICAL PROPERTIES**

Appearance	: Colourless
Odour	: Odourless
Odour threshold	: 700 ppm
pH	: Not applicable.
Boiling point	: -103.7 °C / -154.7 °F
Melting / freezing point	: -169.2 °C / -272.6 °F
Flash point	: -136 °C / -213 °F
Explosion / Flammability limits in air	: 3.1 - 32 % (V)
Auto-ignition temperature	: 450 °C / 842 °F
Vapour pressure	: 4,275 kPa at 1.9 °C / 35.4 °F
Specific gravity	: 0.568 at -104 °C / -155 °F
Density	: 568 kg/m <sup>3</sup> at -104 °C / -155 °F
Water solubility	: 131 mg/l at 25 °C / 77 °F Slight
n-octanol/water partition coefficient (log Pow)	: 1.13
Vapour density (air=1)	: 0.975 at 0 °C / 32 °F
Henry's Coefficient Koc	: 22000 Pa.m <sup>3</sup> / mole (Mackay model) 2 (QSAR)
State of aggregation	: Gas
Thermal conductivity	: 0.0002 J/s/cm <sup>2</sup> /°C at 0.000000 °C / 32.000 °F
Viscosity	: 0.01 centiPoise at 20 °C / 68 °F
Surface tension	: 14 mN/m at -104 °C / -155 °F
Molecular weight	: 28 g/mol
Hygroscopicity	: Slightly soluble.

**10. STABILITY AND REACTIVITY**

<b>Stability</b>	: Polymerises with risk of fire and explosion. Reacts violently with strong oxidising agents. Reacts violently with hydrochloric acid, hydrogen bromide and nitrogen oxides.
<b>Conditions to Avoid</b>	: Heat, flames, and sparks. Exposure to air.
<b>Materials to Avoid</b>	: Strong oxidising agents. Hydrochloric acid, hydrogen bromide and nitrogen oxides.
<b>Hazardous Decomposition Products</b>	: Thermal decomposition is highly dependent on conditions. A complex mixture of airborne solids, liquids and gases, including carbon monoxide, carbon dioxide and other organic compounds will be evolved when this material undergoes combustion or thermal or oxidative degradation.
<b>Hazardous Polymerisation</b>	: Material will spontaneously polymerise.

**11. TOXICOLOGICAL INFORMATION**

<b>Basis for Assessment</b>	: Information given is based on product testing.
<b>Acute Oral Toxicity</b>	: Not applicable. , Rat
<b>Acute Dermal Toxicity</b>	: Not applicable. , Rat
<b>Acute Inhalation Toxicity</b>	: Low toxicity: LC50 >20 mg/l Rat

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- High concentrations may cause central nervous system depression resulting in headaches, dizziness and nausea; continued inhalation may result in unconsciousness and/or death.
- Skin Irritation** : Not irritating to skin.  
**Eye Irritation** : Essentially non-irritating to eyes.  
**Sensitisation** : Not expected to be a skin sensitiser.  
**Repeated Dose Toxicity** : Laboratory animals exposed to high levels of propylene for prolonged periods of time showed evidence of effects in the liver, kidneys and nasal cavity.
- Mutagenicity** : Not considered a mutagenic hazard.  
**Carcinogenicity** : Not carcinogenic in animal studies.  
**Reproductive and Developmental Toxicity** : Not a developmental toxicant. Not expected to be a reproductive toxicant. Not expected to impair fertility.  
**Additional Information** : High gas concentrations will displace available oxygen from the 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.

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**12. ECOLOGICAL INFORMATION**

- Acute Toxicity** :  
**Fish** : Harmful:  $10 < LC/EC/IC50 \leq 100$  mg/l  
**Aquatic Invertebrates** : Expected to have low toxicity:  $LC/EC/IC50 > 1000$  mg/l  
**Algae** : Expected to have low toxicity:  $LC/EC/IC50 > 100$  mg/l  
**Microorganisms** : Expected to have low toxicity:  $LC/EC/IC50 > 1000$  mg/l  
**Persistence/degradability** : Expected to be not readily biodegradable.  
Oxidises rapidly by photo-chemical reactions in air.  
**Bioaccumulation** : Does not bioaccumulate significantly.  
**Other Adverse Effects** : In view of the high rate of loss from solution, the product is unlikely to pose a significant hazard to aquatic life.

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**13. DISPOSAL CONSIDERATIONS**

- Material Disposal** : 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.  
**Local Legislation** : Disposal should be in accordance with applicable regional, national, and local laws and regulations. Local regulations may be more stringent than regional or national requirements and must be complied with.

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**14. TRANSPORT INFORMATION**

- ADR**  
**Class** : 2  
**Hazard identification no.** : 223  
**UN No.** : 1038

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Danger label (primary risk) : 2.1  
Proper shipping name : ETHYLENE, REFRIGERATED LIQUID

**RID**

Class : 2  
Hazard identification no. : 223  
UN No. : 1038  
Danger label (primary risk) : 2.1  
Proper shipping name : ETHYLENE, REFRIGERATED LIQUID

**IMDG**

Identification number : UN 1038  
Proper shipping name : ETHYLENE, REFRIGERATED LIQUID  
Class / Division : 2.1  
Marine pollutant: No

**IATA (Country variations may apply)**

UN No. : 1038  
Proper shipping name : Ethylene, refrigerated liquid  
Class / Division : 2.1

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**15. REGULATORY INFORMATION**

The regulatory information is not intended to be comprehensive. Other regulations may apply to this material

EC Label Name : ETHYLENE  
EC label/EC Number : 200-815-3  
EC Classification : Extremely flammable.  
EC Annex I Number : 601-010-00-3  
EC Symbols : F+ Extremely flammable.  
EC Risk Phrases : R12 Extremely flammable.  
EC Safety Phrases : S9 Keep container in a well-ventilated place.  
S16 Keep away from sources of ignition - No smoking.  
S33 Take precautionary measures against static discharges.

AICS : Listed.  
DSL : Listed.  
INV (CN) : Listed.  
ENCS (JP) : Listed. (2)-12  
TSCA : Listed.  
EINECS : Listed. 200-815-3  
KECI (KR) : Listed. KE-13226  
PICCS (PH) : Listed.

National Legislation :  
OECD. HPV : Listed.

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**16. OTHER INFORMATION**

R-phrase(s)

R12 Extremely flammable.

**MSDS Version Number** : 1**MSDS Effective Date** : 13.07.2003**MSDS Revisions** : A vertical bar (|) in the left margin indicates an amendment from the previous version.**MSDS Regulation** : The content and format of this safety data sheet is in accordance with Commission Directive 2001/58/EC of 27 July 2001, amending for the second time Commission Directive 91/155/EEC.**Uses and Restrictions** : Raw material for use in the chemical industry.**MSDS Distribution** : The information in this document should be made available to all who may handle the product**Disclaimer** : This information is based on our current knowledge and is intended to describe the product for the purposes of health, safety and environmental requirements only. It should not therefore be construed as guaranteeing any specific property of the product.