Ethylene

Version 15.0	Revision Date: 04.04.2024	Date of last issue: 04.12.2020 Date of first issue: 04.12.2020

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifier

Trade name	:	Ethylene
Substance name	:	ethylene
EC-No.	:	200-815-3

1.2 Relevant identified uses of the substance or mixture and uses advised against

Use of the Substance/Mixture	:	Raw material in chemical industry

1.3 Details of the supplier of the safety data sheet

Manufacturer	:	Borealis AB S-444 86 Stenungsund, Sweden Telephone: +46 303 86000 Borealis Polymers Oy P.O.Box 330, FI-06101 Porvoo, Finland Telephone: +358 9 394900
Supplier	:	Borealis AG Trabrennstrasse 6-8, 1020 Vienna, Austria Telephone: +43 1 22400 0
E-mail address	:	sds@borealisgroup.com

1.4 Emergency telephone number

+1 760 476 3962 (3E), Access code: 336296

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

Classification (REGULATION (EC) No 1272/2008) as amended by GB-CLP Regulation, UK SI 2019/720, and UK SI 2020/1567)

Flammable gases, Category 1A	H220: Extremely flammable gas.
Gases under pressure, Refrigerated liquefied gas	H281: Contains refrigerated gas; may cause cryogenic burns or injury.
Specific target organ toxicity - single exposure, Category 3, Central nervous system	H336: May cause drowsiness or dizziness.

2.2 Label elements

Labelling (REGULATION (EC) No 1272/2008) as amended by GB-CLP Regulation, UK SI 2019/720, and UK SI 2020/1567)

Hazard pictograms :

Signal word : Danger

Hazard statements :
H220 Extremely flammable gas.
H281 Contains refrigerated gas; may cause cryogenic burns or injury.
H336 May cause drowsiness or dizziness.

Precautionary statements :

Prevention:

P210 Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
P261 Avoid breathing gas.
P282 Wear cold insulating gloves and either face shield or eye protection.

Response:

P377 Leaking gas fire: Do not extinguish, unless leak can be stopped safely.
P381 In case of leakage, eliminate all ignition sources.
P304 + P340 IF INHALED: Remove person to fresh air and

keep comfortable for breathing.

Storage:

P403 + P233 Store in a well-ventilated place. Keep container tightly closed.

2.3 Other hazards

This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.
Rapid evaporation of the product may cause frostbite.
May displace oxygen and cause rapid suffocation.
Risk of explosion if heated under confinement.
Vapours may form explosive mixtures with air.

SECTION 3: Composition/information on ingredients

3.1 Substances

Substance name : ethylene

EC-No. : 200-815-3

Components

Chemical name	CAS-No. EC-No.	Concentration (% w/w)
ethylene	74-85-1 200-815-3	>= 98

SECTION 4: First aid measures

4.1 Description of first aid measures

General advice : Move out of dangerous area.
In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).
First aider needs to protect himself.

If inhaled : Move to fresh air.
Do not leave the victim unattended.

Causes asphyxiation in high concentrations. The victim will not realize that he/she is suffocating.
Keep warm and at rest and provide fresh air.
Seek medical advice immediately.
Give oxygen or artificial respiration if needed.
If unconscious, place in recovery position and seek medical advice.

In case of skin contact : Remove/ Take off immediately all contaminated clothing.
If clothing already frozen and stuck to the skin:
Do not remove contaminated clothing.
Wash frost-bitten areas with plenty of lukewarm water.
Do not rub affected area.
Seek medical advice.

In case of eye contact : Remove contact lenses.
Rinse thoroughly with plenty of water, also under the eyelids.
Keep eye wide open while rinsing.
Seek medical advice.

If swallowed : Not probable:
The product evaporates readily.

4.2 Most important symptoms and effects, both acute and delayed

Symptoms : Skin contact may provoke the following symptoms:
Frostbite

Inhalation:
Suffocation
Drowsiness

Risks : Vapours may cause drowsiness and dizziness.

4.3 Indication of any immediate medical attention and special treatment needed

Treatment : There is no specific antidote available.
Treat frost-bitten areas as needed.

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media : Dry powder, carbon dioxide, foam and water mist.

Unsuitable extinguishing media	:	Do NOT use water jet.

5.2 Special hazards arising from the substance or mixture

Specific hazards during firefighting	:	Vapours may form explosive mixtures with air. Flash back possible over considerable distance. Do not allow run-off from fire fighting to enter drains or water courses. Risk of explosion. Incomplete combustion may produce: Carbon dioxide (CO_2) Carbon monoxide Smoke

5.3 Advice for firefighters

Special protective equipment for firefighters	:	Wear self-contained breathing apparatus and protective suit.
Further information	:	Attempt to stop leakage without personal risk. If conditions permit, let fire burn itself out. Cool tanks with water spray.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

Vapours can cause suffocation by reducing oxygen available for breathing.
Use personal protective equipment.
Avoid breathing vapours, mist or gas.
Ensure adequate ventilation.
Keep people away from and upwind of spill/leak.
Eliminate all ignition sources if safe to do so.
Beware of vapours accumulating to form explosive concentrations. Vapours can accumulate in low areas.

6.2 Environmental precautions

Prevent further leakage or spillage if safe to do so.
Prevent product from entering environment and drains.
Observe the risk of explosion.
If major spillage occurs, contact the proper local authorities.

6.3 Methods and material for containment and cleaning up

Allow to evaporate.
Ensure adequate ventilation, especially in confined areas.

6.4 Reference to other sections

For personal protection see section 8.

SECTION 7: Handling and storage

7.1 Precautions for safe handling

Advice on safe handling	:	Refill and handle product only in closed system. Prevent leaks by checking valves, pipelines and joints regularly.
Advice on protection against fire and explosion	:	Keep away from sources of ignition - No smoking. Take precautionary measures against static discharges. To avoid ignition of vapours by static electricity discharge, all metal parts of the equipment must be grounded. Ensure adequate ventilation. Risk of explosion if heated under confinement. Vapours may form explosive mixtures with air. High risk of fire in case of leakage. Do not pressurise, cut, weld, braze, solder, drill, or grind on containers.
Hygiene measures	:	When using do not eat, drink or smoke.

7.2 Conditions for safe storage, including any incompatibilities

Requirements for storage areas and containers	:	Keep container in a well-ventilated place. Keep product and empty container away from heat and sources of ignition. Keep in a cool place away from oxidizing agents. Containers which are opened must be carefully resealed and kept upright to prevent leakage.
Advice on common storage	:	Keep away from combustible material. See chapter 10.
Recommended storage temperature	:	< -100 °C

7.3 Specific end use(s)

Specific use(s)	:	Not applicable

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Contains no substances with occupational exposure limit values.

Derived No Effect Level (DNEL):

Substance name	End Use	Exposure routes	Potential health effects	Value
ethylene				
	Remarks:Not applicable			

Predicted No Effect Concentration (PNEC):

Substance name	Environmental Compartment	Value
ethylene		
	Remarks:Not applicable	

8.2 Exposure controls

Engineering measures

Application in a closed system
Provide adequate ventilation.
Use personal protective equipment.

Personal protective equipment

Eye protection : Safety goggles or face-shield.
Equipment should conform to EN 166

Hand protection

Remarks : Cold-insulating gloves (e.g. nitrile rubber).
The selected protective gloves have to satisfy the specifications of Regulation (EU) 2016/425 and the standard EN 374 derived from it. Take note of the information given by the producer concerning permeability and break through times, and of special workplace conditions (mechanical strain, duration of contact).

Skin and body protection : Wear suitable protective clothing.
Leather boots
Safety shoes

Respiratory protection : In case of insufficient ventilation: Self-contained breathing apparatus.
Vapours can cause suffocation by reducing oxygen available for breathing.

Environmental exposure controls

General advice : Prevent further leakage or spillage if safe to do so. Prevent product from entering environment and drains. Observe the risk of explosion. If major spillage occurs, contact the proper local authorities.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

Appearance	:	gaseous Refrigerated liquefied gas
Colour	:	colourless
Odour	:	mild, sweet
Odour Threshold	:	No data available
pH	:	No data available
Melting point	:	-169 °C
Boiling point	:	-104 °C
Flash point	:	Not applicable
Evaporation rate	:	No data available
Flammability (solid, gas)	:	Extremely flammable.
Upper explosion limit / Upper flammability limit	:	Upper flammability limit 36 %(V)
Lower explosion limit / Lower flammability limit	:	Lower flammability limit 2,7 %(V)
Vapour pressure	:	2.124 hPa (-90 °C)
Relative vapour density	:	0,98 (Air = 1.0)
Relative density	:	0,5678 (-104 °C)
Solubility(ies)		
Water solubility	:	0,131 g/l (25 °C)

Solubility in other solvents	:	No data available
Partition coefficient: n-octanol/water	:	log Pow: 1,13 (20 °C)
Auto-ignition temperature	:	450 °C (1.013 hPa)
Decomposition temperature	:	Heating or fire can release toxic and irritating gases.
Viscosity		
Viscosity, dynamic	:	Not applicable
Viscosity, kinematic	:	Not applicable

9.2 Other information

Molecular weight	:	28,05 g/mol

SECTION 10: Stability and reactivity

10.1 Reactivity

No dangerous reaction known under conditions of normal use.

10.2 Chemical stability

Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions

Hazardous reactions	:	Vapours may form explosive mixture with air.

10.4 Conditions to avoid

Conditions to avoid	:	Keep away from heat and sources of ignition. Observe the risk of explosion.

10.5 Incompatible materials

Materials to avoid	:	Strong oxidizing agents

10.6 Hazardous decomposition products

In case of fire hazardous decomposition products may be produced such as:
Carbon monoxide, carbon dioxide and unburned hydrocarbons (smoke).

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity

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

Components:

ethylene:

Acute oral toxicity	:	Remarks: No data available
Acute inhalation toxicity	:	LC50 (Rat): > 65,4 mg/l, > 57000 ppm Test atmosphere: gas
Acute dermal toxicity	:	Remarks: No data available

Skin corrosion/irritation

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

Components:

ethylene:

Remarks	:	study technically not feasible (gaseous) Contact with liquid or refrigerated gas can cause cold burns and frostbite.

Serious eye damage/eye irritation

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

Components:

ethylene:

Remarks	:	study technically not feasible (gaseous) Contact with liquid or refrigerated gas can cause cold burns and frostbite.

Respiratory or skin sensitisation

Skin sensitisation

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

Respiratory sensitisation

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

Components:

ethylene:

Remarks	:	study technically not feasible (gaseous)

Germ cell mutagenicity

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

Components:

ethylene:

Genotoxicity in vitro	:	Test Type: Ames test Metabolic activation: with and without metabolic activation Method: Mutagenicity (Salmonella typhimurium - reverse mutation assay) Result: negative Remarks: In vitro tests did not show mutagenic effects
Genotoxicity in vivo	:	Test Type: Micronucleus test Species: Rat Result: negative

Carcinogenicity

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

Components:

ethylene:

Species	:	Rat
Application Route	:	Inhalation
Exposure time	:	106 weeks
Activity duration	:	6 h
Frequency of Treatment	:	5 days/week
NOAEL	:	3.000 ppm
Method	:	OECD Test Guideline 453

Result	:	negative
Remarks	:	IARC evaluation: Group 3: Not classifiable as to its carcinogenicity to humans

Reproductive toxicity

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

Components:

ethylene:

Effects on fertility	:	Species: Rat Application Route: inhalation (gas) General Toxicity - Parent: NOAEL: 5.737 mg/m³ General Toxicity F1: NOAEL: 5.737 mg/m³ Method: OECD Test Guideline 421
Effects on foetal development	:	Species: Rat General Toxicity Maternal: NOAEC: 5.737 mg/m³ Developmental Toxicity: NOAEC: 5.737 mg/m³ Method: OECD Test Guideline 421

STOT - single exposure

Vapours may cause drowsiness and dizziness.

STOT - repeated exposure

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

Repeated dose toxicity

Components:

ethylene:

NOAEC	:	10000 ppm
Application Route	:	Inhalation
Method	:	OECD Test Guideline 413
Application Route	:	Dermal
Remarks	:	study technically not feasible (gaseous)
Application Route	:	Oral
Remarks	:	study technically not feasible (gaseous)

Aspiration toxicity

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

Further information

Product:

Remarks : Absorbs into the body by inhalation.

SECTION 12: Ecological information

12.1 Toxicity

Components:

ethylene:

Toxicity to fish	:	LC50 : 126 mg/l Exposure time: 96 h Method: QSAR Remarks: Aquatic toxicity is unlikely. (gaseous)
Toxicity to daphnia and other aquatic invertebrates	:	LC50 (Daphnia (water flea)): 62 mg/l Exposure time: 48 h Method: QSAR Remarks: Aquatic toxicity is unlikely. (gaseous)
Toxicity to algae/aquatic plants	:	EbC50 (Scenedesmus capricornutum (fresh water algae)): 30,3 mg/l Exposure time: 96 h Test Type: Growth inhibition Method: QSAR
Toxicity to microorganisms	:	Remarks: No data available
Toxicity to fish (Chronic toxicity)	:	NOELR: 22,083 mg/l Exposure time: 32 d Species: Oncorhynchus mykiss (rainbow trout) Method: QSAR Chronic Toxicity Value: 12,385 mg/l

		Exposure time: 30 d Method: QSAR
Toxicity to daphnia and other aquatic invertebrates (Chronic toxicity)	:	NOELR: 41,311 mg/l Exposure time: 21 d Species: Daphnia magna (Water flea) Method: QSAR Chronic Toxicity Value: 6,311 mg/l Species: Daphnia sp. (water flea) Method: QSAR

12.2 Persistence and degradability

Components:

ethylene:

Biodegradability	:	Method: QSAR Remarks: Readily biodegradable.

12.3 Bioaccumulative potential

Components:

ethylene:

Bioaccumulation	:	Bioconcentration factor (BCF): 2,59 Remarks: Bioaccumulation not expected: Partition coefficient (n-octanol/water) log Pow < 3.
Partition coefficient: n-octanol/water	:	log Pow: 1,13 (20 °C)

12.4 Mobility in soil

Components:

ethylene:

Mobility	:	Remarks: Soil, Not expected to adsorb on soil., The product evaporates readily to air.

12.5 Results of PBT and vPvB assessment

Product:

Assessment	:	This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher..

12.6 Other adverse effects

Product:

Environmental fate and pathways	:	Prone to photochemical degradation, reacting with OH radicals and ozone.
Endocrine disrupting potential	:	The substance/mixture does not contain components considered to have endocrine disrupting properties according to REACH Article 57(f) or Commission Delegated regulation (EU) 2017/2100 or Commission Regulation (EU) 2018/605 at levels of 0.1% or higher.
Additional ecological information	:	No known adverse effect on the environment. Biological effects on: terrestrial plants. Symptoms: inhibition of growth yield reduction curling of leaves ripening of fruits.

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product	:	Where possible recycling is preferred to disposal or incineration.

SECTION 14: Transport information

14.1 UN number

ADR	:	UN 1038
IMDG	:	UN 1038

14.2 UN proper shipping name

ADR	:	ETHYLENE, REFRIGERATED LIQUID
IMDG	:	ETHYLENE, REFRIGERATED LIQUID

14.3 Transport hazard class(es)

ADR	:	2
IMDG	:	2.1

14.4 Packing group

ADR

Packing group	:	Not assigned by regulation
Classification Code	:	3F
Hazard Identification Number	:	223
Labels	:	2.1
Tunnel restriction code	:	(B/D)

IMDG

Packing group	:	Not assigned by regulation
Labels	:	2.1
EmS Code	:	F-D, S-U

14.5 Environmental hazards

ADR

Environmentally hazardous	:	no

IMDG

Marine pollutant	:	no

14.6 Special precautions for user

The transport classification(s) provided herein are for informational purposes only, and solely based upon the properties of the unpackaged material as it is described within this Safety Data Sheet. Transportation classifications may vary by mode of transportation, package sizes, and variations in regional or country regulations.

14.7 Transport in bulk according to Annex II of Marpol and the IBC Code

Remarks	:	Not applicable

SECTION 15: Regulatory information

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture

Relevant EU provisions transposed through retained EU law

REACH - Restrictions on the manufacture, placing on	:	Conditions of restriction for the

the market and use of certain dangerous substances, mixtures and articles (Annex XVII)		following entries should be considered: Number on list 40
REACH - Restrictions on the manufacture, placing on the market and use of certain dangerous substances, mixtures and articles (Annex XVII)	:	Conditions of restriction for the following entries should be considered: Number on list 40

Seveso III: Directive 2012/18/EU of the European Parliament and of the Council on the control of major-accident hazards involving dangerous substances.

Category		Quantity 1	Quantity 2
P2	FLAMMABLE GASES	10 t	50 t

Other regulations:

No data available

15.2 Chemical safety assessment

A Chemical Safety Assessment has been carried out for this substance.

SECTION 16: Other information

Full text of other abbreviations

ADN - European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterways; ADR - Agreement concerning the International Carriage of Dangerous Goods by Road; AIIC - Australian Inventory of Industrial Chemicals; ASTM - American Society for the Testing of Materials; bw - Body weight; CLP - Classification Labelling Packaging Regulation; Regulation (EC) No 1272/2008; CMR - Carcinogen, Mutagen or Reproductive Toxicant; DIN - Standard of the German Institute for Standardisation; DSL - Domestic Substances List (Canada); ECHA - European Chemicals Agency; EC-Number - European Community number; 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; 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; NO(A)EC - No Observed (Adverse) Effect Concentration; NO(A)EL - No Observed (Adverse) Effect Level; NOELR - No Observable Effect Loading Rate; 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; RID - Regulations concerning the International Carriage of Dangerous Goods by Rail; SADT - Self-Accelerating Decomposition Temperature; SDS - Safety Data Sheet; SVHC - Substance of very high concern; TCSI - Taiwan Chemical Substance Inventory; 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

Further information

Sources of key data used to compile the Safety Data Sheet	:	Chemical Safety Report, Ethylene, Lower Olefins and Aromatics REACH Consortium, 2021

Items where changes have been made to the previous version are highlighted in the body of this document by two vertical lines.

Ethylene

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