

**ethylene oxide****SECTION 1: Identification of the substance/mixture and of the company/undertaking****1.1. Product identifier**

Product name	: ethylene oxide
Synonyms	: ethene oxide; oxirane
Registration number REACH	: 01-2119432402-53
Product type REACH	: Substance/mono-constituent
CAS number	: 75-21-8
EC index number	: 603-023-00-X
EC number	: 200-849-9
Molecular mass	: 44.05 g/mol
Formula	: C <sub>2</sub> H <sub>4</sub> O

**1.2. Relevant identified uses of the substance or mixture and uses advised against****1.2.1 Relevant identified uses**

Industrial use  
Chemical raw material  
Biocide

**1.2.2 Uses advised against**

No uses advised against

**1.3. Details of the supplier of the safety data sheet****Supplier of the safety data sheet**

BALCHEM NV  
Westvaardijk 85  
B-1850 Grimbergen Belgium  
☎ +32 2 251 60 87  
✉ +32 2 252 17 51  
info.grimbergen@balchem.com

**Distributor of the product**

BALCHEM NV  
Westvaardijk 85  
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**1.4. Emergency telephone number**

24h/24h (Telephone advice: English, French, German, Dutch):  
+32 14 58 45 45 (BIG)

**SECTION 2: Hazards identification****2.1. Classification of the substance or mixture**

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

Class	Category	Hazard statements
Flam. Gas	category 1	H220: Extremely flammable gas.
Press. Gas	Liquefied gas	H280: Contains gas under pressure; may explode if heated.
Chem. Unst. Gas	Category A	H230: May react explosively even in the absence of air.
Carc.	category 1B	H350: May cause cancer.
Muta.	category 1B	H340: May cause genetic defects.
Acute Tox.	category 3	H331: Toxic if inhaled.
STOT RE	category 1	H372: Causes damage to organs (central nervous system) through prolonged or repeated exposure.
Acute Tox.	category 4	H302: Harmful if swallowed.
Skin Irrit.	category 2	H315: Causes skin irritation.
Eye Irrit.	category 2	H319: Causes serious eye irritation.

# ethylene oxide

STOT SE	category 3	H335: May cause respiratory irritation.
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## 2.2. Label elements



**Signal word**

Danger

**H-statements**

H220	Extremely flammable gas.
H280	Contains gas under pressure; may explode if heated.
H230	May react explosively even in the absence of air.
H350	May cause cancer.
H340	May cause genetic defects.
H331	Toxic if inhaled.
H302	Harmful if swallowed.
H372	Causes damage to organs (central nervous system) through prolonged or repeated exposure.
H335	May cause respiratory irritation.
H319	Causes serious eye irritation.
H315	Causes skin irritation.

**P-statements**

P210	Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
P280	Wear protective gloves, protective clothing and eye protection/face protection.
P260	Do not breathe gas.
P304 + P340	IF INHALED: Remove person to fresh air and keep comfortable for breathing.
P362 + P364	Take off contaminated clothing and wash it before reuse.
P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

**Supplemental information**

Restricted to professional users.

## 2.3. Other hazards

Gas/vapour spreads at floor level: ignition hazard  
 Odour threshold is well above the exposure limit  
 Produces effects on the nervous system  
 May cause frostbites  
 Caution! Substance is absorbed through the skin

## SECTION 3: Composition/information on ingredients

### 3.1. Substances

Name REACH Registration No	CAS No EC No	Conc. (C)	Classification according to CLP	Note	Remark
ethylene oxide 01-2119432402-53	75-21-8 200-849-9	>99.9 %	Flam. Gas 1; H220 Press. Gas - Liquefied gas; H280 Chem. Unst. Gas A; H230 Carc. 1B; H350 Muta. 1B; H340 Acute Tox. 3; H331 STOT RE 1; H372 Acute Tox. 4; H302 Skin Irrit. 2; H315 Eye Irrit. 2; H319 STOT SE 3; H335	(1)(2)(6)(10)	Mono-constituent

(1) For H-statements in full: see heading 16  
 (2) Substance with a Community workplace exposure limit  
 (6) Enumerated in Annex VI of Regulation (EC) No. 1272/2008 but the classification has been adapted after evaluation of available test data  
 (10) Subject to restrictions of Annex XVII of Regulation (EC) No. 1907/2006

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## 3.2. Mixtures

Not applicable

## SECTION 4: First aid measures

### 4.1. Description of first aid measures

#### General:

Check the vital functions. Unconscious: maintain adequate airway and respiration. Respiratory arrest: artificial respiration or oxygen. Cardiac arrest: perform resuscitation. Victim conscious with laboured breathing: half-seated. Victim in shock: on his back with legs slightly raised. Vomiting: prevent asphyxia/aspiration pneumonia. Prevent cooling by covering the victim (no warming up). Keep watching the victim. Give psychological aid. Keep the victim calm, avoid physical strain. Depending on the victim's condition: doctor/hospital. Never give alcohol to drink.

#### After inhalation:

Remove the victim into fresh air. Immediately consult a doctor/medical service. Do not apply mouth-to-mouth resuscitation.

#### After skin contact:

Wash immediately with lots of water. Soap may be used. Do not apply (chemical) neutralizing agents. Take victim to a doctor if irritation persists. In case of frostbites: Wash immediately with lots of water (15 minutes)/shower. Do not remove clothing if it sticks to the skin. Cover wounds with sterile bandage. Consult a doctor/medical service.

#### After eye contact:

Rinse immediately with plenty of water for 15 minutes. Do not apply neutralizing agents. Remove contact lenses, if present and easy to do. Continue rinsing. Take victim to an ophthalmologist.

#### After ingestion:

Immediately after ingestion: give lots of water to drink. Do not induce vomiting. Consult a doctor/medical service if you feel unwell.

### 4.2. Most important symptoms and effects, both acute and delayed

#### 4.2.1 Acute symptoms

##### After inhalation:

Dry/sore throat. Irritation of the respiratory tract. Irritation of the nasal mucous membranes. Central nervous system depression. Nausea. Vomiting. Headache. Dizziness. Disturbances of consciousness. EXPOSURE TO HIGH CONCENTRATIONS: Disturbances of heart rate. Respiratory difficulties. FOLLOWING SYMPTOMS MAY APPEAR LATER: Cramps/uncontrolled muscular contractions. Risk of lung oedema.

##### After skin contact:

Frostbites. Tingling/irritation of the skin. FOLLOWING SYMPTOMS MAY APPEAR LATER: Swelling of the skin. Red skin. Blisters. May stain the skin. AFTER CONTACT WITH WATER: Caustic burns/corrosion of the skin.

##### After eye contact:

Irritation of the eye tissue. Frostbites.

##### After ingestion:

Not applicable.

#### 4.2.2 Delayed symptoms

No effects known.

### 4.3. Indication of any immediate medical attention and special treatment needed

If applicable and available it will be listed below.

## SECTION 5: Firefighting measures

### 5.1. Extinguishing media

#### 5.1.1 Suitable extinguishing media:

Small fire: Quick-acting ABC powder extinguisher, Quick-acting BC powder extinguisher.

#### 5.1.2 Unsuitable extinguishing media:

Small fire: Quick-acting CO2 extinguisher, Water (water can be used to control jet flame), Foam.

Major fire: Water (water can be used to control jet flame), Foam.

### 5.2. Special hazards arising from the substance or mixture

Upon combustion: CO and CO2 are formed. On heating: explosive decomposition. Polymerizes on exposure to temperature rise, on exposure to impurities, on exposure to light, on exposure to (some) metals and on exposure to (strong) acids/bases with heat release resulting in increased fire or explosion risk. Reacts slowly on exposure to water (moisture): heat release resulting in increased fire or explosion risk.

### 5.3. Advice for firefighters

#### 5.3.1 Instructions:

If no hazard for/from the surroundings: controlled burning. If hazardous substances are nearby: consider extinguishment. Extinguish only if gas supply/leak can be shut afterwards. Cool tanks/drums with water spray/remove them into safety. Physical explosion risk: extinguish/cool from behind cover. Do not move the load if exposed to heat. After cooling: persistent risk of physical explosion. Take account of toxic fire-fighting water. Use water moderately and if possible collect or contain it.

#### 5.3.2 Special protective equipment for fire-fighters:

Insulating gloves. Head/neck protection. Protective clothing. Compressed air/oxygen apparatus.

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## SECTION 6: Accidental release measures

### 6.1. Personal precautions, protective equipment and emergency procedures

Keep upwind. Seal off low-lying areas. Close doors and windows of adjacent premises. Stop engines and no smoking. No naked flames or sparks. Spark- and explosionproof appliances and lighting equipment. Protect substance against light. Avoid ingress of water in the containers.

#### 6.1.1 Protective equipment for non-emergency personnel

See heading 8.2

#### 6.1.2 Protective equipment for emergency responders

Insulating gloves. Head/neck protection. Protective clothing.

Suitable protective clothing

See heading 8.2

### 6.2. Environmental precautions

Contain released product, pump into suitable containers. Plug the leak, cut off the supply. Dam up the liquid spill. Tip the container on one side to stop the leakage. Try to reduce evaporation. Take account of toxic/corrosive precipitation water. Prevent soil and water pollution. Prevent spreading in sewers.

### 6.3. Methods and material for containment and cleaning up

Damaged/cooled tanks must be emptied. Do not use compressed air for pumping over spills. Prevent evaporation by covering with: foam. Take collected spill to manufacturer/competent authority. Wash clothing and equipment after handling.

### 6.4. Reference to other sections

See heading 13.

## SECTION 7: Handling and storage

The information in this section is a general description. If applicable and available, exposure scenarios are attached in annex. Always use the relevant exposure scenarios that correspond to your identified use.

### 7.1. Precautions for safe handling

Use spark-/explosionproof appliances and lighting system. Use earthed equipment. Keep away from naked flames/heat. Keep away from ignition sources/sparks. Gas/vapour heavier than air at 20°C. Observe very strict hygiene - avoid contact. Remove contaminated clothing immediately.

### 7.2. Conditions for safe storage, including any incompatibilities

#### 7.2.1 Safe storage requirements:

Storage temperature: < 50 °C. Store in a cool area. Store in a dark area. Ventilation at floor level. Fireproof storeroom. Provide for an automatic sprinkler system. Provide for a tub to collect spills. Provide the tank with earthing. Unauthorized persons are not admitted. Under a shelter/in the open. Detached building. Keep only in the original container. Limited time of storage. May be stored under inert gas. Meet the legal requirements.

#### 7.2.2 Keep away from:

Heat sources, ignition sources, combustible materials, oxidizing agents, (strong) acids, (strong) bases, highly flammable materials, metals, halogens, alcohols, amines, water/moisture.

#### 7.2.3 Suitable packaging material:

Stainless steel, carbon steel, polypropylene.

#### 7.2.4 Non suitable packaging material:

Aluminium, iron, copper, tin.

### 7.3. Specific end use(s)

If applicable and available, exposure scenarios are attached in annex. See information supplied by the manufacturer.

## SECTION 8: Exposure controls/personal protection

### 8.1. Control parameters

#### 8.1.1 Occupational exposure

##### a) Occupational exposure limit values

If limit values are applicable and available these will be listed below.

#### Belgium

Oxyde d'éthylène	Time-weighted average exposure limit 8 h	1 ppm
	Time-weighted average exposure limit 8 h	1.8 mg/m <sup>3</sup>

#### The Netherlands

Ethyleenoxide	Time-weighted average exposure limit 8 h (Public occupational exposure limit value)	0.46 ppm
	Time-weighted average exposure limit 8 h (Public occupational exposure limit value)	0.84 mg/m <sup>3</sup>

#### France

Oxyde d'éthylène	Time-weighted average exposure limit 8 h (VL: Valeur non réglementaire indicative)	1 ppm
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# ethylene oxide

Oxyde d'éthylène	Short time value (VL: Valeur non réglementaire indicative)	5 ppm
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## UK

Ethylene oxide	Time-weighted average exposure limit 8 h (Workplace exposure limit (EH40/2005))	5 ppm
	Time-weighted average exposure limit 8 h (Workplace exposure limit (EH40/2005))	9.2 mg/m <sup>3</sup>

## USA (TLV-ACGIH)

Ethylene oxide	Time-weighted average exposure limit 8 h (TLV - Adopted Value)	1 ppm
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### b) National biological limit values

If limit values are applicable and available these will be listed below.

#### 8.1.2 Sampling methods

Product name	Test	Number
Ethylene oxide (organic and inorganic gases by Extractive FTIR)	NIOSH	3800
Ethylene Oxide (Qazi-Ketcham)	NON	14
Ethylene Oxide	NIOSH	1614
Ethylene Oxide	NIOSH	3702
Ethylene Oxide	OSHA	1010
Ethylene Oxide	OSHA	30
Ethylene Oxide	OSHA	49
Ethylene Oxide	OSHA	50

#### 8.1.3 Applicable limit values when using the substance or mixture as intended

If limit values are applicable and available these will be listed below.

#### 8.1.4 DNEL/PNEC values

##### DNEL/DMEL - Workers

##### ethylene oxide

Effect level (DNEL/DMEL)	Type	Value	Remark
DMEL	Long-term systemic effects inhalation	2 mg/m <sup>3</sup>	
DNEL	Acute systemic effects inhalation	10 mg/m <sup>3</sup>	

##### PNEC

##### ethylene oxide

Compartments	Value	Remark
Fresh water	0.084 mg/l	
Marine water	0.0084 mg/l	
Aqua (intermittent releases)	0.84 mg/l	
STP	13 mg/l	
Fresh water sediment	0.329 mg/kg sediment dw	
Marine water sediment	0.0329 mg/kg sediment dw	
Soil	0.0165 mg/kg soil dw	

#### 8.1.5 Control banding

If applicable and available it will be listed below.

## 8.2. Exposure controls

The information in this section is a general description. If applicable and available, exposure scenarios are attached in annex. Always use the relevant exposure scenarios that correspond to your identified use.

### 8.2.1 Appropriate engineering controls

Use spark-/explosionproof appliances and lighting system. Use earthed equipment. Keep away from naked flames/heat. Keep away from ignition sources/sparks. Measure the concentration in the air regularly. Work under local exhaust/ventilation. Exhaust gas must be neutralised.

### 8.2.2 Individual protection measures, such as personal protective equipment

Observe very strict hygiene - avoid contact. Do not eat, drink or smoke during work.

#### a) Respiratory protection:

Gas mask with filter type AX. Self-contained breathing apparatus if conc. in air > 5 ppm.

#### b) Hand protection:

Insulated gloves.

- materials (good resistance)

Butyl rubber.

- materials (less resistance)

Neoprene, natural rubber.

- materials (poor resistance)

Polyethylene, PVC, nitrile rubber, leather.

#### c) Eye protection:

Protective goggles.

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## d) Skin protection:

Head/neck protection. Protective clothing.

## 8.2.3 Environmental exposure controls:

See headings 6.2, 6.3 and 13

## SECTION 9: Physical and chemical properties

### 9.1. Information on basic physical and chemical properties

Physical form	Gas
Odour	Sweet odour Ether-like odour
Odour threshold	257 - 690 ppm 470 - 1263 mg/m <sup>3</sup>
Colour	Colourless
Particle size	Not applicable (gas)
Explosion limits	2.6 - 100 vol % 47 - 1820 g/m <sup>3</sup>
Flammability	Extremely flammable gas.
Log Kow	-0.3 ; 25 °C
Dynamic viscosity	0.254 mPa.s ; 10 °C ; Liquid
Kinematic viscosity	Not determined
Melting point	-111 °C
Boiling point	10.7 °C ; 1013 hPa
Flash point	Not applicable
Evaporation rate	Ether ; Not applicable 72 ; Butyl acetate
Relative vapour density	Not applicable
Vapour pressure	1458 hPa ; 20 °C 3950 hPa ; 50 °C 1752 hPa ; 25 °C
Solubility	Water ; complete Ethanol ; complete Ether ; complete Acetone ; soluble
Relative density	0.88 ; 10 °C ; Liquid
Decomposition temperature	>570 °C
Auto-ignition temperature	429 °C
Explosive properties	No chemical group associated with explosive properties
Oxidising properties	No chemical group associated with oxidising properties
pH	7 ; 10 %

### 9.2. Other information

Minimum ignition energy	0.065 mJ
Specific conductivity	4 µS/m
Critical temperature	196 °C
Critical pressure	71900 hPa
Surface tension	0.0267 N/m ; 10 °C ; 1000 g/l
Absolute density	887 kg/m <sup>3</sup> ; 10 °C

## SECTION 10: Stability and reactivity

### 10.1. Reactivity

May be ignited by sparks. Gas/vapour spreads at floor level: ignition hazard. Substance has neutral reaction.

### 10.2. Chemical stability

Unstable on exposure to heat. Unstable on exposure to light. Unstable on exposure to air.

### 10.3. Possibility of hazardous reactions

Reacts slowly on exposure to water (moisture): heat release resulting in increased fire or explosion risk. May react explosively even in the absence of air. Reacts violently with many compounds e.g.: with (strong) oxidizers: (increased) risk of fire/explosion. Prolonged storage: polymerizes slowly.

### 10.4. Conditions to avoid

Use spark-/explosionproof appliances and lighting system. Use earthed equipment. Keep away from naked flames/heat. Keep away from ignition sources/sparks.

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## 10.5. Incompatible materials

Combustible materials, oxidizing agents, (strong) acids, (strong) bases, highly flammable materials, metals, halogens, alcohols, amines, water/moisture.

## 10.6. Hazardous decomposition products

Upon combustion: CO and CO<sub>2</sub> are formed.

## SECTION 11: Toxicological information

### 11.1. Information on toxicological effects

#### 11.1.1 Test results

##### Acute toxicity

###### ethylene oxide

Route of exposure	Parameter	Method	Value	Exposure time	Species	Value determination	Remark
Oral	LD50	Other	330 mg/kg bw		Rat (male)	Experimental value	Aqueous solution
Dermal						Data waiving	
Inhalation (gases)	LC50	Other	2.63 mg/l air	4 h	Rat (male)	Experimental value	
Inhalation (gases)	LC50	Other	1460 ppm	4 h	Rat (male)	Experimental value	

As the substance is a gas, inhalation is the most likely route of exposure

##### Conclusion

Harmful if swallowed.

Toxic if inhaled.

##### Corrosion/irritation

###### ethylene oxide

Route of exposure	Result	Method	Exposure time	Time point	Species	Value determination	Remark
Eye	Irritating	Equivalent to OECD 405		24; 48 hours	Rabbit	Experimental value	Aqueous solution
Skin	Irritating		1 minutes - 60 minutes		Rabbit	Experimental value	Aqueous solution
Inhalation	Irritating					Annex VI	

Insufficient data available. Classification according to Regulation (EC) No 1272/2008 - Annex VI

The liquid form can cause frostbites, typical for all liquefied gases

##### Conclusion

Causes skin irritation.

Causes serious eye irritation.

May cause respiratory irritation.

Specific target organ toxicity, single exposure: classified as irritant to respiratory organs

##### Respiratory or skin sensitisation

###### ethylene oxide

Route of exposure	Result	Method	Exposure time	Observation time point	Species	Value determination	Remark
Skin						Data waiving	

The study on skin sensitisation does not need to be conducted as the substance is a gas

##### Conclusion

Not classified as sensitizing for skin

No respiratory sensitization data available

##### Specific target organ toxicity

###### ethylene oxide

Route of exposure	Parameter	Method	Value	Organ	Effect	Exposure time	Species	Value determination
Dermal								Data waiving
Inhalation (vapours)	NOAEC	Equivalent to OECD 453	10 ppm	Central nervous system	No effect	104 weeks (6h/day, 5 days/week)	Rat (male/female)	Experimental value
Inhalation (vapours)	NOAEC	Subchronic toxicity test	10 ppm		No effect	10 weeks (6h/day, 5 days/week) - 11 weeks (6h/day, 5	Mouse (male/female)	Experimental value

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As the substance is a gas, inhalation is the most likely route of exposure

## Conclusion

Causes damage to organs (central nervous system) through prolonged or repeated exposure.

## Mutagenicity (in vitro)

### ethylene oxide

Result	Method	Test substrate	Effect	Value determination
Positive without metabolic activation	Equivalent to OECD 471	Bacteria (S.typhimurium)		Experimental value
Positive without metabolic activation	Equivalent to OECD 476	Chinese hamster lung fibroblasts (V79)		Experimental value

## Mutagenicity (in vivo)

### ethylene oxide

Result	Method	Exposure time	Test substrate	Organ	Value determination
Positive	Other	4 h	Rat (male/female)		Experimental value

## Conclusion

May cause genetic defects.

## Carcinogenicity

### ethylene oxide

Route of exposure	Parameter	Method	Value	Exposure time	Species	Effect	Organ	Value determination
Inhalation (vapours)	NOAEC	Equivalent to OECD 453	10 ppm	104 weeks (6h/day, 5 days/week)	Rat (male/female)	No neoplastic effects		Experimental value

## Conclusion

May cause cancer.

## Reproductive toxicity

### ethylene oxide

	Parameter	Method	Value	Exposure time	Species	Effect	Organ	Value determination
Developmental toxicity	NOAEC	Equivalent to OECD 414	0.18 mg/l air	6 days (gestation, daily) - 15 days (gestation, daily)	Rat (female)	No effect		Experimental value
Maternal toxicity	NOAEC	Equivalent to OECD 414	0.18 mg/l air	6 days (gestation, daily) - 15 days (gestation, daily)	Rat (female)	No effect		Experimental value
Effects on fertility	NOAEC (P)	Equivalent to OECD 415	0.054 mg/l air	14 weeks (6h/day, 5 days/week)	Rat (male/female)	No effect		Experimental value

## Conclusion

Not classified for reprotoxic or developmental toxicity

## Toxicity other effects

### ethylene oxide

No (test) data available

## Chronic effects from short and long-term exposure

### ethylene oxide

ON CONTINUOUS/REPEATED EXPOSURE/CONTACT: Dry skin. Red skin. Itching. Inflammation/damage of the eye tissue. Nausea. Vomiting. Sensorial disturbances. Headache. Impairment of the nervous system. Movement disturbances. Impairment of the blood forming system. Coordination disorders. Myasthenia. Change in the haemogramme/blood composition. Degeneration of heart tissue. Tumours of the gastrointestinal tract. Possible bladder tumours. Brain affection. Possible premature birth.



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## SECTION 12: Ecological information

### 12.1. Toxicity

ethylene oxide

	Parameter	Method	Value	Duration	Species	Test design	Fresh/salt water	Value determination
Acute toxicity fishes	LC50	EPA 660/3 - 75/009	84 mg/l	96 h	Pimephales promelas	Static system	Fresh water	Experimental value
Acute toxicity crustacea	LC50	EPA 600/3-75/009	137 mg/l - 300 mg/l	48 h	Daphnia magna	Static system	Fresh water	Experimental value
Toxicity algae and other aquatic plants	EC50	Equivalent to OECD 201	240 mg/l	96 h	Pseudokirchneriella subcapitata	Static system	Fresh water	Experimental value
Toxicity aquatic micro-organisms	EC10	OECD 209	130 mg/l	180 minutes		Static system	Fresh water	Experimental value

#### Conclusion

Not classified as dangerous for the environment according to the criteria of Regulation (EC) No 1272/2008

### 12.2. Persistence and degradability

ethylene oxide

#### Biodegradation water

Method	Value	Duration	Value determination
OECD 301C: Modified MITI Test (I)	93 % - 98 %	28 day(s)	Read-across
OECD 301D: Closed Bottle Test	69 %	20 day(s)	Experimental value

#### Phototransformation air (DT50 air)

Method	Value	Conc. OH-radicals	Value determination
SRC AOP v1.92	57.2 day(s)	500000 /cm <sup>3</sup>	QSAR

#### Half-life soil (t1/2 soil)

Method	Value	Primary degradation/mineralisation	Value determination
	Not applicable		

#### Conclusion

Readily biodegradable in water

### 12.3. Bioaccumulative potential

ethylene oxide

#### Log Kow

Method	Remark	Value	Temperature	Value determination
		-0.3	25 °C	

#### Conclusion

Not bioaccumulative

### 12.4. Mobility in soil

ethylene oxide

#### (log) Koc

Parameter	Method	Value	Value determination
log Koc	SRC PCKOCWIN v1.66	0.157	QSAR

#### Volatility (Henry's Law constant H)

Value	Method	Temperature	Remark	Value determination
12.159 Pa.m <sup>3</sup> /mol	SRC HENRYWIN v3.10	25 °C		QSAR

#### Percent distribution

Method	Fraction air	Fraction biota	Fraction sediment	Fraction soil	Fraction water	Value determination
Mackay level I	7.75 %		0 %	0 %	92.23 %	QSAR

#### Conclusion

Low potential for adsorption in soil

### 12.5. Results of PBT and vPvB assessment

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Substance does not meet the criteria of PBT, nor the criteria of vPvB according to Annex XIII of Regulation (EC) No 1907/2006, so is neither PBT nor vPvB.

## 12.6. Other adverse effects

ethylene oxide

### Fluorinated greenhouse gases (Regulation (EU) No 517/2014)

Not included in the list of fluorinated greenhouse gases (Regulation (EU) No 517/2014)

### Ozone-depleting potential (ODP)

Not classified as dangerous for the ozone layer (Regulation (EC) No 1005/2009)

## SECTION 13: Disposal considerations

The information in this section is a general description. If applicable and available, exposure scenarios are attached in annex. Always use the relevant exposure scenarios that correspond to your identified use.

### 13.1. Waste treatment methods

#### 13.1.1 Provisions relating to waste

##### European Union

Hazardous waste according to Directive 2008/98/EC, as amended by Regulation (EU) No 1357/2014.

Waste material code (Directive 2008/98/EC, Decision 2000/0532/EC).

16 05 04\* (gases in pressure containers and discarded chemicals: gases in pressure containers (including halons) containing hazardous substances).

Depending on branch of industry and production process, also other waste codes may be applicable.

#### 13.1.2 Disposal methods

Refer to manufacturer/supplier for information on recovery/ recycling. Remove waste in accordance with local and/or national regulations. Hazardous waste shall not be mixed together with other waste. Different types of hazardous waste shall not be mixed together if this may entail a risk of pollution or create problems for the further management of the waste. Hazardous waste shall be managed responsibly. All entities that store, transport or handle hazardous waste shall take the necessary measures to prevent risks of pollution or damage to people or animals. Do not discharge into drains or the environment.

#### 13.1.3 Packaging/Container

##### European Union

Waste material code packaging (Directive 2008/98/EC).

15 01 10\* (packaging containing residues of or contaminated by dangerous substances).

## SECTION 14: Transport information

### Road (ADR)

#### 14.1. UN number

UN number	1040
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#### 14.2. UN proper shipping name

Proper shipping name	Ethylene oxide with nitrogen
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#### 14.3. Transport hazard class(es)

Hazard identification number	263
Class	2
Classification code	2TF

#### 14.4. Packing group

Packing group	
Labels	2.3+2.1

#### 14.5. Environmental hazards

Environmentally hazardous substance mark	no
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#### 14.6. Special precautions for user

Special provisions	342
Limited quantities	none.

### Rail (RID)

#### 14.1. UN number

UN number	1040
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#### 14.2. UN proper shipping name

Proper shipping name	Ethylene oxide with nitrogen
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#### 14.3. Transport hazard class(es)

Hazard identification number	263
Class	2
Classification code	2TF

#### 14.4. Packing group

Packing group	
Labels	2.3+2.1 (+13)

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## 14.5. Environmental hazards

Environmentally hazardous substance mark	no
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## 14.6. Special precautions for user

Special provisions	342
Limited quantities	none.

## Inland waterways (ADN)

### 14.1. UN number

UN number	1040
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### 14.2. UN proper shipping name

Proper shipping name	Ethylene oxide with nitrogen
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### 14.3. Transport hazard class(es)

Class	2
Classification code	2TF

### 14.4. Packing group

Packing group	
Labels	2.3+2.1

## 14.5. Environmental hazards

Environmentally hazardous substance mark	no
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## 14.6. Special precautions for user

Special provisions	342
Limited quantities	none.

## Sea (IMDG/IMSBC)

### 14.1. UN number

UN number	1040
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### 14.2. UN proper shipping name

Proper shipping name	ethylene oxide with nitrogen
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### 14.3. Transport hazard class(es)

Class	2.3
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### 14.4. Packing group

Packing group	
Labels	2.3 + 2.1

## 14.5. Environmental hazards

Marine pollutant	-
Environmentally hazardous substance mark	no

## 14.6. Special precautions for user

Special provisions	342
Limited quantities	none.

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

Annex II of MARPOL 73/78	Not applicable
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## Air (ICAO-TI/IATA-DGR)

### 14.1. UN number

Transport	Forbidden
UN number	1040

### 14.2. UN proper shipping name

Proper shipping name	Ethylene oxide with nitrogen
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### 14.3. Transport hazard class(es)

Class	2.3
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### 14.4. Packing group

Packing group	
Labels	

## 14.5. Environmental hazards

Environmentally hazardous substance mark	no
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## 14.6. Special precautions for user

Special provisions	A2
Limited quantities: maximum net quantity per packaging	

# ethylene oxide

## SECTION 15: Regulatory information

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

#### European legislation:

VOC content Directive 2010/75/EU

VOC content	Remark
100 %	

REACH Annex XVII - Restriction

Subject to restrictions of Annex XVII of Regulation (EC) No. 1907/2006: restrictions on the manufacture, placing on the market and use of certain dangerous substances, mixtures and articles.

	Designation of the substance, of the group of substances or of the mixture	Conditions of restriction
ethylene oxide	Substances which appear in Part 3 of Annex VI to Regulation (EC) No 1272/2008 classified as carcinogen category 1A or 1B (Table 3.1) or carcinogen category 1 or 2 (Table 3.2) and listed as follows: - Carcinogen category 1A (Table 3.1)/carcinogen category 1 (Table 3.2) listed in Appendix 1 - Carcinogen category 1B (Table 3.1)/carcinogen category 2 (Table 3.2) listed in Appendix 2	Without prejudice to the other parts of this Annex the following shall apply to entries 28 to 30:1. Shall not be placed on the market, or used, — as substances, — as constituents of other substances, or, — in mixtures, for supply to the general public when the individual concentration in the substance or mixture is equal to or greater than: — either the relevant specific concentration limit specified in Part 3 of Annex VI to Regulation (EC) No 1272/2008, or, — the relevant concentration specified in Directive 1999/45/EC where no specific concentration limit is set out in Part 3 of Annex VI to Regulation (EC) No 1272/2008. Without prejudice to the implementation of other Community provisions relating to the classification, packaging and labelling of substances and mixtures, suppliers shall ensure before the placing on the market that the packaging of such substances and mixtures is marked visibly, legibly and indelibly as follows: "Restricted to professional users".2. By way of derogation, paragraph 1 shall not apply to: (a) medicinal or veterinary products as defined by Directive 2001/82/EC and Directive 2001/83/EC; (b) cosmetic products as defined by Directive 76/768/EEC; (c) the following fuels and oil products: — motor fuels which are covered by Directive 98/70/EC, — mineral oil products intended for use as fuel in mobile or fixed combustion plants, — fuels sold in closed systems (e.g. liquid gas bottles); (d) artists' paints covered by Directive 1999/45/EC; (e) the substances listed in Appendix 11, column 1, for the applications or uses listed in Appendix 11, column 2. Where a date is specified in column 2 of Appendix 11, the derogation shall apply until the said date.
ethylene oxide	Substances which appear in Part 3 of Annex VI to Regulation (EC) No 1272/2008 classified as germ cell mutagen category 1A or 1B (Table 3.1) or mutagen category 1 or 2 (Table 3.2) and listed as follows: - Mutagen category 1A (Table 3.1)/mutagen category 1 (Table 3.2) listed in Appendix 3 - Mutagen category 1B (Table 3.1) /mutagen category 2 (Table 3.2) listed in Appendix 4	Without prejudice to the other parts of this Annex the following shall apply to entries 28 to 30:1. Shall not be placed on the market, or used, — as substances, — as constituents of other substances, or, — in mixtures, for supply to the general public when the individual concentration in the substance or mixture is equal to or greater than: — either the relevant specific concentration limit specified in Part 3 of Annex VI to Regulation (EC) No 1272/2008, or, — the relevant concentration specified in Directive 1999/45/EC where no specific concentration limit is set out in Part 3 of Annex VI to Regulation (EC) No 1272/2008. Without prejudice to the implementation of other Community provisions relating to the classification, packaging and labelling of substances and mixtures, suppliers shall ensure before the placing on the market that the packaging of such substances and mixtures is marked visibly, legibly and indelibly as follows: "Restricted to professional users".2. By way of derogation, paragraph 1 shall not apply to: (a) medicinal or veterinary products as defined by Directive 2001/82/EC and Directive 2001/83/EC; (b) cosmetic products as defined by Directive 76/768/EEC; (c) the following fuels and oil products: — motor fuels which are covered by Directive 98/70/EC, — mineral oil products intended for use as fuel in mobile or fixed combustion plants, — fuels sold in closed systems (e.g. liquid gas bottles); (d) artists' paints covered by Directive 1999/45/EC; (e) the substances listed in Appendix 11, column 1, for the applications or uses listed in Appendix 11, column 2. Where a date is specified in column 2 of Appendix 11, the derogation shall apply until the said date.
ethylene oxide	Substances classified as flammable gases category 1 or 2, flammable liquids categories 1, 2 or 3, flammable solids category 1 or 2, substances and mixtures which, in contact with water, emit flammable gases, category 1, 2 or 3, pyrophoric liquids category 1 or pyrophoric solids category 1, regardless of whether they appear in Part 3 of Annex VI to that Regulation or not.	1. Shall not be used, as substance or as mixtures in aerosol dispensers where these aerosol dispensers are intended for supply to the general public for entertainment and decorative purposes such as the following: — metallic glitter intended mainly for decoration, — artificial snow and frost, — "whoopie" cushions, — silly string aerosols, — imitation excrement, — horns for parties, — decorative flakes and foams, — artificial cobwebs, — stink bombs.2. Without prejudice to the application of other Community provisions on

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the classification, packaging and labelling of substances, suppliers shall ensure before the placing on the market that the packaging of aerosol dispensers referred to above is marked visibly, legibly and indelibly with:  
 "For professional users only".3. By way of derogation, paragraphs 1 and 2 shall not apply to the aerosol dispensers referred to Article 8 (1a) of Council Directive 75/ 324/EEC.4. The aerosol dispensers referred to in paragraphs 1 and 2 shall not be placed on the market unless they conform to the requirements indicated.

## National legislation Belgium

Additional classification	Oxyde d'éthylène; C; La mention "C" signifie que l'agent en question relève du champ d'application de l'arrêté royal du 2 décembre 1993 concernant la protection des travailleurs contre les risques liés à l'exposition à des agents cancérogènes et mutagènes au travail.
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## National legislation The Netherlands

Waterbezwaarlijkheid	Z (2)
SZW - Lijst van kankerverwekkende stoffen	Ethyleenoxide; Listed in SZW-list of carcinogenic substances
SZW - Lijst van mutagene stoffen	Ethyleenoxide; Listed in SZW-list of mutagenic substances
SZW - Lijst van voor de voortplanting giftige stoffen (vruchtbaarheid)	Ethyleenoxide; 1B; May damage fertility.

## National legislation France

Catégorie cancérogène	Oxyde d'éthylène
Catégorie mutagène	Oxyde d'éthylène; M1B

## National legislation Germany

WGK	3; Classification water polluting based on the R-phrases in compliance with Verwaltungsvorschrift wassergefährdender Stoffe (VwVwS) of 27 July 2005 (Anhang 3)
TA-Luft	5.2.7.1.1; II

## National legislation United Kingdom

Carcinogen	Ethylene oxide; Carc
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## Other relevant data

IARC - classification	1; Ethylene oxide
TLV - Carcinogen	Ethylene oxide; A2

## 15.2. Chemical safety assessment

A chemical safety assessment has been performed.

## SECTION 16: Other information

### Full text of any H-statements referred to under headings 2 and 3:

- H220 Extremely flammable gas.
- H230 May react explosively even in the absence of air.
- H280 Contains gas under pressure; may explode if heated.
- H302 Harmful if swallowed.
- H315 Causes skin irritation.
- H319 Causes serious eye irritation.
- H331 Toxic if inhaled.
- H335 May cause respiratory irritation.
- H340 May cause genetic defects.
- H350 May cause cancer.
- H372 Causes damage to organs (central nervous system) through prolonged or repeated exposure.

(*)	INTERNAL CLASSIFICATION BY BIG
CLP (EU-GHS)	Classification, labelling and packaging (Globally Harmonised System in Europe)
DMEL	Derived Minimal Effect Level
DNEL	Derived No Effect Level
EC50	Effect Concentration 50 %
ErC50	EC50 in terms of reduction of growth rate
LC50	Lethal Concentration 50 %
LD50	Lethal Dose 50 %
NOAEL	No Observed Adverse Effect Level
NOEC	No Observed Effect Concentration
OECD	Organisation for Economic Co-operation and Development
PBT	Persistent, Bioaccumulative & Toxic
PNEC	Predicted No Effect Concentration

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STP                      Sludge Treatment Process  
vPvB                    very Persistent & very Bioaccumulative

## Specific concentration limits CLP

ethylene oxide	C ≥ 30 %	Chem. Unst. Cat. A; H230	UN Manual of Tests and Criteria
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The information in this safety data sheet is based on data and samples provided to BIG. The sheet was written to the best of our ability and according to the state of knowledge at that time. The safety data sheet only constitutes a guideline for the safe handling, use, consumption, storage, transport and disposal of the substances/preparations/mixtures mentioned under point 1. New safety data sheets are written from time to time. Only the most recent versions may be used. Old versions must be destroyed. Unless indicated otherwise word for word on the safety data sheet, the information does not apply to substances/preparations/mixtures in purer form, mixed with other substances or in processes. The safety data sheet offers no quality specification for the substances/preparations/mixtures in question. Compliance with the instructions in this safety data sheet does not release the user from the obligation to take all measures dictated by common sense, regulations and recommendations or which are necessary and/or useful based on the real applicable circumstances. BIG does not guarantee the accuracy or exhaustiveness of the information provided and cannot be held liable for any changes by third parties. This safety data sheet is only to be used within the European Union, Switzerland, Iceland, Norway and Liechtenstein. Any use outside of this area is at your own risk. Use of this safety data sheet is subject to the licence and liability limiting conditions as stated in your BIG licence agreement or when this is failing the general conditions of BIG. All intellectual property rights to this sheet are the property of BIG and its distribution and reproduction are limited. Consult the mentioned agreement/conditions for details.

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