

>9% Ethylene oxide ≤87% / Carbon dioxide

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

1.1 Product identifier:

Product name	: >9% Ethylene oxide ≤87% / Carbon dioxide
Synonyms	: carbon dioxide/ethylene oxide, mixtures, 9%<conc ethylene oxide≤87%; ethylene oxide/carbon dioxide, mixtures, 9% <conc ethylene oxide≤87%
Registration number REACH	: Not applicable (mixture)
Product type REACH	: Mixture
Formula	: C2H4O+CO2

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

1.2.1 Relevant identified uses

Industrial use
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

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

Distributor of the product

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

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:

2.1.1 Classification according to Regulation EC No 1272/2008

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.
Acute Tox.	category 4	H302: Harmful if swallowed.
STOT RE	category 1	H372: Causes damage to the central nervous system through prolonged or repeated exposure.
Eye Irrit.	category 2	H319: Causes serious eye irritation.
STOT SE	category 3	H335: May cause respiratory irritation.
Skin Irrit.	category 2	H315: Causes skin irritation.

2.1.2 Classification according to Directive 67/548/EEC-1999/45/EC

Classified as dangerous in accordance with the criteria of Directives 67/548/EEC and 1999/45/EC
F+; R12 - Extremely flammable.

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Carc. Cat. 2; R45 - May cause cancer.

Muta. Cat. 2; R46 - May cause heritable genetic damage.

T; R23 - 48/23 - Toxic by inhalation. Toxic: danger of serious damage to health by prolonged exposure through inhalation.

Xi; R36/37/38 - Irritating to eyes, respiratory system and skin.

R6 - Explosive with or without contact with air.

2.2 Label elements:

Labelling according to Regulation EC No 1272/2008 (CLP)



Contains: ethylene oxide.

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 the central nervous system through prolonged or repeated exposure.
H319	Causes serious eye irritation.
H335	May cause respiratory 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.
P308 + P313	IF exposed or concerned: Get medical advice/attention.
P311	Call a POISON CENTER/doctor.
P312	Call a POISON CENTER/doctor if you feel unwell.

Supplemental information

Restricted to professional users.

2.3 Other hazards:

CLP

May be ignited by sparks
Gas/vapour spreads at floor level: ignition hazard
Heat may cause pressure rise in tanks/drums: explosion risk
Odour threshold is well above the exposure limit
Produces effects on the nervous system
May cause frostbites
Caution! Substance is absorbed through the skin
Causes damage to the central nervous system
Probably human mutagenic

SECTION 3: Composition/information on ingredients

3.1 Substances:

Not applicable

3.2 Mixtures:

Reason for revision: 2

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Name REACH Registration No	CAS No EC No	Conc. (C)	Classification according to DSD/DPD	Classification according to CLP	Note	Remark
ethylene oxide 01-2119432402-53	75-21-8 200-849-9	9% <C≤87%	F+; R12 Carc. Cat. 2; R45 Muta. Cat. 2; R46 T; R23 - 48/23 Xi; R36/37/38 R6	Flam. Gas 1; H220 Press. Gas - Liquefied gas; H280 Chem. Unst. Gas A; H230 Carc. 1B; H350 Muta. 1B; H340 Acute Tox. 3; H331 Acute Tox. 4; H302 STOT RE 1; H372 STOT SE 3; H335 Eye Irrit. 2; H319 Skin Irrit. 2; H315	(1)(2)(6)(10)	Constituent
carbon dioxide	124-38-9 204-696-9	13% <C≤91%		Press. Gas - Liquefied gas; H280	(1)(2)	Constituent

(1) For R-phrases and 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

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.

After inhalation:

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

After skin contact:

Wash immediately with lots of water. Soap may be used. Take victim to a doctor if irritation persists. In case of frostbites: Wash immediately with lots of water (15 minutes)/shower. Do not apply (chemical) neutralizing agents. Remove clothing while washing. Do not remove clothing if it sticks to the skin. Cover wounds with sterile bandage. Consult a doctor/medical service. If burned surface > 10%: take victim to hospital.

After eye contact:

Rinse immediately with plenty of water for 15 minutes. Take victim to an ophthalmologist. Do not apply neutralizing agents.

After ingestion:

Not applicable.

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:

No effects known.

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:

Preferably: water spray. Preferably: alcohol resistant foam. BC powder. Carbon dioxide.

5.1.2 Unsuitable extinguishing media:

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No unsuitable extinguishing media known.

5.2 Special hazards arising from the substance or mixture:

Upon combustion: CO and CO₂ are formed. Polymerizes on exposure to temperature rise.

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. Protective goggles. Head/neck protection. Protective clothing. Large spills/in enclosed spaces: gas-tight suit. Compressed air/oxygen apparatus.

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. 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. Protective goggles. Head/neck protection. Protective clothing. Large spills/in enclosed spaces: gas-tight suit.

Suitable protective clothing

See heading 8.2

6.2 Environmental precautions:

Contain released substance, 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. 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. Take precautions against electrostatic charges. Keep away from naked flames/heat. Keep away from ignition sources/sparks. Gas/vapour heavier than air at 20°C. Observe strict hygiene. 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. 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. Keep only in the original container. Meet the legal requirements.

7.2.2 Keep away from:

Heat sources, ignition sources, combustible materials, oxidizing agents, metals.

7.2.3 Suitable packaging material:

Steel, stainless steel, synthetic material.

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.

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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 ³
Kooldioxide	Time-weighted average exposure limit 8 h (Public occupational exposure limit value)	4919 ppm
	Time-weighted average exposure limit 8 h (Public occupational exposure limit value)	9000 mg/m ³

EU

Carbon dioxide	Time-weighted average exposure limit 8 h (Indicative occupational exposure limit value)	5000 ppm
	Time-weighted average exposure limit 8 h (Indicative occupational exposure limit value)	9000 mg/m ³

Belgium

Carbone (dioxyde de)	Time-weighted average exposure limit 8 h	5000 ppm (A)
	Time-weighted average exposure limit 8 h	9131 mg/m ³ (A)
	Short time value	30000 ppm (A)
	Short time value	54784 mg/m ³ (A)
Oxyde d'éthylène	Time-weighted average exposure limit 8 h	1 ppm
	Time-weighted average exposure limit 8 h	1.8 mg/m ³

La mention "A" signifie que l'agent libère un gaz ou une vapeur qui n'ont en eux-mêmes aucun effet physiologique mais peuvent diminuer le taux d'oxygène dans l'air. Lorsque le taux d'oxygène descend en dessous de 17-18 % (vol/vol) le manque d'oxygène provoque des suffocations qu'aucun symptôme préalable n'annonce

USA (TLV-ACGIH)

Carbon dioxide	Time-weighted average exposure limit 8 h (TLV - Adopted Value)	5000 ppm
	Short time value (TLV - Adopted Value)	30000 ppm
Ethylene oxide	Time-weighted average exposure limit 8 h (TLV - Adopted Value)	1 ppm

Germany

Kohlenstoffdioxid	Time-weighted average exposure limit 8 h (TRGS 900)	5000 ppm
	Time-weighted average exposure limit 8 h (TRGS 900)	9100 mg/m ³

France

Carbone (dioxyde de)	Time-weighted average exposure limit 8 h (VRI: Valeur réglementaire indicative)	5000 ppm
	Time-weighted average exposure limit 8 h (VRI: Valeur réglementaire indicative)	9000 mg/m ³
Oxyde d'éthylène	Time-weighted average exposure limit 8 h (VL: Valeur non réglementaire indicative)	1 ppm
	Short time value (VL: Valeur non réglementaire indicative)	5 ppm

UK

Carbon dioxide	Time-weighted average exposure limit 8 h (Workplace exposure limit (EH40/2005))	5000 ppm
	Time-weighted average exposure limit 8 h (Workplace exposure limit (EH40/2005))	9150 mg/m ³
	Short time value (Workplace exposure limit (EH40/2005))	15000 ppm
	Short time value (Workplace exposure limit (EH40/2005))	27400 mg/m ³
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 ³

b) National biological limit values

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

8.1.2 Sampling methods

If applicable and available it will be listed below.

Carbon Dioxide	NIOSH	6603
Carbon Dioxide	OSHA	ID 172
Ethylene oxide (organic and inorganic gases by Extractive FT	NIOSH	3800

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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 - Workers

ethylene oxide

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

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. Take precautions against electrostatic charges. Keep away from naked flames/heat. Keep away from ignition sources/sparks. Measure the concentration in the air regularly. Work under local exhaust/ventilation.

8.2.2 Individual protection measures, such as personal protective equipment

Observe strict hygiene. Do not eat, drink or smoke during work.

a) Respiratory protection:

Wear gas mask with filter type A if conc. in air > exposure limit. High vapour/gas concentration: self-contained respirator.

b) Hand protection:

Insulated gloves.

- materials (good resistance)

Butyl rubber.

c) Eye protection:

Protective goggles.

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	Medicinal odour
	Ether-like odour
Odour threshold	No data available
Colour	Colourless
Particle size	Not applicable (gas)
Explosion limits	No data available
Flammability	Extremely flammable gas.
Log Kow	Not applicable (mixture)

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Dynamic viscosity	No data available
Kinematic viscosity	No data available
Melting point	No data available
Boiling point	No data available
Flash point	No data available
Evaporation rate	No data available
Relative vapour density	No data available
Vapour pressure	No data available
Solubility	ethanol ; soluble ether ; soluble
Relative density	No data available
Decomposition temperature	No data available
Auto-ignition temperature	No data available
Explosive properties	No chemical group associated with explosive properties
Oxidising properties	No chemical group associated with oxidising properties
pH	No data available

9.2 Other information:

Critical temperature	-10 °C - 70 °C
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SECTION 10: Stability and reactivity

10.1 Reactivity:

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

10.2 Chemical stability:

Unstable on exposure to heat.

10.3 Possibility of hazardous reactions:

Reacts violently with many compounds e.g.: with (strong) oxidizers: (increased) risk of fire/explosion.

10.4 Conditions to avoid:

Use spark-/explosionproof appliances and lighting system. Take precautions against electrostatic charges. Keep away from naked flames/heat. Keep away from ignition sources/sparks.

10.5 Incompatible materials:

Combustible materials, oxidizing agents, metals.

10.6 Hazardous decomposition products:

Upon combustion: CO and CO₂ are formed.

SECTION 11: Toxicological information

11.1 Information on toxicological effects:

11.1.1 Test results

Acute toxicity

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No (test) data on the mixture available

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	

Classification is based on the relevant ingredients

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

Conclusion

Toxic if inhaled.

Harmful if swallowed.

Corrosion/irritation

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No (test)data on the mixture available

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		1-60 minutes		Rabbit	Experimental value	Aqueous solution
Inhalation	Irritating					Annex VI	

Classification is based on the relevant ingredients

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

Conclusion

Causes serious eye irritation.

Causes skin irritation.

May cause respiratory irritation.

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

Respiratory or skin sensitisation

>9% Ethylene oxide ≤87% / Carbon dioxide

No (test)data on the mixture available

ethylene oxide

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

Judgement is based on the relevant ingredients

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

Conclusion

Not classified as sensitizing for skin

Not classified as sensitizing for inhalation

Specific target organ toxicity

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No (test)data on the mixture available

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	10-11 weeks (6h/day, 5	Mouse (male/female)	Experimental value

Classification is based on the relevant ingredients

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

Conclusion

Causes damage to the nervous system through prolonged or repeated exposure.

Mutagenicity (in vitro)

>9% Ethylene oxide ≤87% / Carbon dioxide

No (test)data on the mixture available

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		Experimental value

Mutagenicity (in vivo)

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No (test)data on the mixture available

ethylene oxide

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

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Carcinogenicity

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No (test) data on the mixture available

ethylene oxide

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

Reproductive toxicity

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No (test) data on the mixture available

ethylene oxide

	Parameter	Method	Value	Exposure time	Species	Effect	Organ	Value determination
Developmental toxicity	NOAEC	Equivalent to OECD 414	0.18 mg/l air	6-15 days (gestation, daily)	Rat (female)	No effect		Experimental value
Maternal toxicity	NOAEC	Equivalent to OECD 414	0.18 mg/l air	6-15 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

Classification is based on the relevant ingredients

Conclusion CMR

May cause genetic defects.

May cause cancer.

Toxicity to reproduction is unlikely to be significant

Chronic effects from short and long-term exposure

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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.

SECTION 12: Ecological information

12.1 Toxicity:

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No (test) data on the mixture available

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 invertebrates	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	Pseudokirchnerie lla 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

carbon dioxide

	Parameter	Method	Value	Duration	Species	Test design	Fresh/salt water	Value determination
Acute toxicity fishes	LC50		35 mg/l	96 h	Salmo gairdneri			Literature study; Lethal

Judgement of the mixture is based on the relevant ingredients

Conclusion

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

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12.2 Persistence and degradability:

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Half-life soil (t1/2 soil)

Method	Value	Primary degradation/mineralisation	Value determination
			Not applicable (gas)

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 ³	QSAR

Half-life soil (t1/2 soil)

Method	Value	Primary degradation/mineralisation	Value determination
Not applicable			

carbon dioxide

Half-life soil (t1/2 soil)

Method	Value	Primary degradation/mineralisation	Value determination
Not applicable			

Conclusion

Contains readily biodegradable component(s)

12.3 Bioaccumulative potential:

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Log Kow

Method	Remark	Value	Temperature	Value determination
	Not applicable (mixture)			

ethylene oxide

Log Kow

Method	Remark	Value	Temperature	Value determination
		-0.3	25 °C	

carbon dioxide

Log Kow

Method	Remark	Value	Temperature	Value determination
		0.83		Experimental value

Conclusion

Does not contain bioaccumulative component(s)

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 ³ /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

carbon dioxide

Volatility (Henry's Law constant H)

Value	Method	Temperature	Remark	Value determination
0.0152 atm m ³ /mol		25 °C		Estimated value

Conclusion

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>9% Ethylene oxide ≤87% / Carbon dioxide

Not applicable (gas)

12.5 Results of PBT and vPvB assessment:

Does not contain component(s) that meet(s) the criteria of PBT and/or vPvB as listed in Annex XIII of Regulation (EC) No 1907/2006.

12.6 Other adverse effects:

>9% Ethylene oxide ≤87% / Carbon dioxide

Global warming potential (GWP)

None of the known components is included in the list of fluorinated greenhouse gases (Regulation (EC) No 517/2014)

Ozone-depleting potential (ODP)

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

ethylene oxide

Global warming potential (GWP)

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

carbon dioxide

Global warming potential (GWP)

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

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

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 dangerous substances).

Depending on branch of industry and production process, also other waste codes may be applicable. Hazardous waste according to Directive 2008/98/EC.

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

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	1041
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14.2 UN proper shipping name:

Proper shipping name	Ethylene oxide and carbon dioxide mixture
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14.3 Transport hazard class(es):

Hazard identification number	239
Class	2
Classification code	2F

14.4 Packing group:

Packing group	
Labels	2.1

14.5 Environmental hazards:

Environmentally hazardous substance mark	no
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14.6 Special precautions for user:

Special provisions	
Limited quantities	none.

Rail (RID)

14.1 UN number:

UN number	1041
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Reason for revision: 2

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>9% Ethylene oxide ≤87% / Carbon dioxide

14.2 UN proper shipping name:

Proper shipping name	Ethylene oxide and carbon dioxide mixture
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14.3 Transport hazard class(es):

Hazard identification number	239
Class	2
Classification code	2F

14.4 Packing group:

Packing group	
Labels	2.1 (+13)

14.5 Environmental hazards:

Environmentally hazardous substance mark	no
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14.6 Special precautions for user:

Special provisions	
Limited quantities	none.

Inland waterways (ADN)

14.1 UN number:

UN number	1041
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14.2 UN proper shipping name:

Proper shipping name	Ethylene oxide and carbon dioxide mixture
----------------------	---

14.3 Transport hazard class(es):

Class	2
Classification code	2F

14.4 Packing group:

Packing group	
Labels	2.1

14.5 Environmental hazards:

Environmentally hazardous substance mark	no
--	----

14.6 Special precautions for user:

Special provisions	
Limited quantities	none.

Sea (IMDG/IMSBC)

14.1 UN number:

UN number	1041
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14.2 UN proper shipping name:

Proper shipping name	ethylene oxide and carbon dioxide mixture
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14.3 Transport hazard class(es):

Class	2.1
-------	-----

14.4 Packing group:

Packing group	
Labels	2.1

14.5 Environmental hazards:

Marine pollutant	-
Environmentally hazardous substance mark	no

14.6 Special precautions for user:

Special provisions	
Limited quantities	none.

14.7 Transport in bulk according to Annex II of MARPOL 73/78 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:

UN number	1041
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14.2 UN proper shipping name:

Proper shipping name	Ethylene oxide and carbon dioxide mixture
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14.3 Transport hazard class(es):

Class	2.1
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14.4 Packing group:

Packing group	
Labels	2.1

14.5 Environmental hazards:

Reason for revision: 2

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>9% Ethylene oxide ≤87% / Carbon dioxide

Environmentally hazardous substance mark	no
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14.6 Special precautions for user:

Special provisions	A1
Passenger and cargo transport: limited quantities: maximum net quantity per packaging	

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
≤ 87 %	

Plant protection products - listed ingredient

Contains component(s) included in implementing Regulation (EU) No 540/2011

REACH Annex XVII - Restriction

Contains component(s) 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,	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:

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	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.	<ul style="list-style-type: none"> — metallic glitter intended mainly for decoration, — artificial snow and frost, — “whoopee” cushions, — silly string aerosols, — imitation excrement, — horns for parties, — decorative flakes and foams, — artificial cobwebs, — stink bombs. <p>2. Without prejudice to the application of other Community provisions on 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.</p>
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National legislation The Netherlands

>9% Ethylene oxide ≤87% / Carbon dioxide

Waste identification (the Netherlands)	LWCA (the Netherlands): KGA category 06
Waterbezwaarlijkheid	2

ethylene oxide

SZW - List of carcinogenic substances	Listed in SZW-list of carcinogenic substances
SZW - List of mutagenic substances	Listed in SZW-list of mutagenic substances
SZW - List of reprotoxic substances (fertility)	May have an effect on fertility

National legislation Germany

>9% Ethylene oxide ≤87% / Carbon dioxide

WGK	2; Classification water polluting based on the components in compliance with Verwaltungsvorschrift wassergefährdender Stoffe (VwVwS) of 27 July 2005 (Anhang 4)
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ethylene oxide

MAK - Krebserzeugend Kategorie	2
MAK - Keimzellmutagen Kategorie	2
TA-Luft	5.2.7.1.1; II

carbon dioxide

MAK 8-Stunden-Mittelwert ppm	Kohlendioxid; 5000 ppm
MAK 8-Stunden-Mittelwert mg/m ³	Kohlendioxid; 9100 mg/m ³

National legislation France

>9% Ethylene oxide ≤87% / Carbon dioxide

No data available

ethylene oxide

Catégorie cancérogène	C1B
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National legislation Belgium

>9% Ethylene oxide ≤87% / Carbon dioxide

No data available

ethylene oxide

Additional classification	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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Other relevant data

>9% Ethylene oxide ≤87% / Carbon dioxide

No data available

ethylene oxide

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

15.2 Chemical safety assessment:

No chemical safety assessment is required.

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SECTION 16: Other information

Labelling according to Directive 67/548/EEC-1999/45/EC (DSD/DPD)

Labels



Extremely flammable



Toxic

Contains: ethylene oxide.

R-phrases

- 45 May cause cancer
- 46 May cause heritable genetic damage
- 06 Explosive with or without contact with air
- 12 Extremely flammable
- 23 Also toxic by inhalation
- 36/37/38 Irritating to eyes, respiratory system and skin
- 48/23 Also toxic: danger of serious damage to health by prolonged exposure through inhalation

S-phrases

- 53 Avoid exposure - obtain special instructions before use
- 45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible)

Additional recommendations

Restricted to professional users.

Full text of any R-phrases referred to under headings 2 and 3:

- R06 Explosive with or without contact with air
- R12 Extremely flammable
- R23 Toxic by inhalation
- R36/37/38 Irritating to eyes, respiratory system and skin
- R45 May cause cancer
- R46 May cause heritable genetic damage
- R48/23 Toxic: danger of serious damage to health by prolonged exposure through inhalation

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 the central nervous system through prolonged or repeated exposure.

(*) = INTERNAL CLASSIFICATION BY BIG

PBT-substances = persistent, bioaccumulative and toxic substances

DSD Dangerous Substance Directive

DPD Dangerous Preparation Directive

CLP (EU-GHS) Classification, labelling and packaging (Globally Harmonised System in Europe)

Specific concentration limits CLP

ethylene oxide	C ≥ 30 %	Chem. Unst. Cat. A; H230	UN Manual of Tests and Criteria
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Specific concentration limits DSD

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

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