C5H12 500 ppm; C4H10 2000 ppm; C4H10 2000 ppm;CO2 1,5 %; C3H8 2 %; N2 4 %; C2H6 8,2 %;CH4 83,85 %

Safety Data Sheet

according to the REACH Regulation (EC) 1907/2006 amended by Regulation (EU) 2020/878
Issue date: 20/12/2012 Revision date: 19/05/2026 Supersedes version of: 24/01/2017 Version: 2.0

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

1.1. Product identifier

Product form : Mixture
Name : C5H12 500 ppm; C4H10 2000 ppm; C4H10 2000 ppm;CO2 1,5 %; C3H8 2 %; N2 4 %; C2H6 8,2 %;CH4 83,85 %
Trade name : H 2-8 K

Product code : 000010000950

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

1.2.1. Relevant identified uses

Relevant identified uses : Industrial and professional use for chemical analysis, calibration, (routine) quality control, laboratory use, under controlled conditions.
Perform risk assessment prior to use.

1.2.2. Uses advised against

Uses advised against : Uses other than those listed above are not supported, contact your supplier for more information on other uses.
Consumer use.

1.3. Details of the supplier of the safety data sheet

Linde Gas GmbH
Carl-von-Linde-Platz 1
A-4651 Stadl-Paura
Austria
T +43 50 4273
office@at.linde-gas.com

1.4. Emergency telephone number

Emergency number : UMCO/NCEC: +44 1865 407333 (English); +49 89 220 61012 (German)

SECTION 2: Hazards identification

2.1. Classification of the substance or mixture

Classification according to Regulation (EC) No. 1272/2008 [CLP]

Physical hazards	Flammable gases, Category 1A	H220
	Gases under pressure : Compressed gas	H280

Full text of H- and EUH-statements: see section 16

Adverse physicochemical, human health and environmental effects

No additional information available

2.2. Label elements

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

Hazard pictograms (CLP) :

GHS02 GHS04

Signal word (CLP) : Danger

Hazard statements (CLP) : H220 - Extremely flammable gas.
H280 - Contains gas under pressure; may explode if heated.

Precautionary statements (CLP)

- Prevention : P210 - Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
- Response : P377 - Leaking gas fire: Do not extinguish, unless leak can be stopped safely.
P381 - In case of leakage, eliminate all ignition sources.
- Storage : P403 - Store in a well-ventilated place.

2.3. Other hazards

Other hazards : Asphyxiant in high concentrations. These high concentrations are within the flammability range. Not classified as PBT or vPvB. The substance/mixture has no endocrine disrupting properties. The substance/mixture has no endocrine disrupting properties.

Contains no PBT and/or vPvB substances ≥ 0.1% assessed in accordance with REACH Annex XIII

The mixture does not contain substance(s) included in the list established in accordance with Article 59(1) of REACH for having endocrine disrupting properties, or substance(s) are not identified as having endocrine disrupting properties in accordance with the criteria set out in Commission Delegated Regulation (EU) 2017/2100 or Commission Regulation (EU) 2018/605 at a concentration equal to or greater than 0,1 %

SECTION 3: Composition/information on ingredients

3.1. Substances

Not applicable

3.2. Mixtures

Name	Product identifier	%	Classification according to Regulation (EC) No. 1272/2008 [CLP] ATE, EUH-statements, M-Factors
Methane (Main constituent)	CAS-No.: 74-82-8 EC-No.: 200-812-7 EC Index-No.: 601-001-00-4 REACH-no: 01-2119474442-39	83.85	Flam. Gas 1A, H220 Press. Gas (Comp.), H280
Ethane (Component)	CAS-No.: 74-84-0 EC-No.: 200-814-8 EC Index-No.: 601-002-00-X REACH-no: 01-2119486765-21	8.2	Flam. Gas 1A, H220 Press. Gas (Liq.), H280
Nitrogen (Component)	CAS-No.: 7727-37-9 EC-No.: 231-783-9 REACH-no: *1	4	Press. Gas (Comp.), H280

Name	Product identifier	%	Classification according to Regulation (EC) No. 1272/2008 [CLP] ATE, EUH-statements, M-Factors
Propane (Component)	CAS-No.: 74-98-6 EC-No.: 200-827-9 EC Index-No.: 601-003-00-5 REACH-no: 01-2119486944-21	2	Flam. Gas 1A, H220 Press. Gas (Liq.), H280
Carbon dioxide (Component)	CAS-No.: 124-38-9 EC-No.: 204-696-9 REACH-no: *1	1.5	Press. Gas (Liq.), H280
butane (Component)	CAS-No.: 106-97-8 EC-No.: 203-448-7 EC Index-No.: 649-200-00-5 REACH-no: 01-2119474691-32	0.2	Flam. Gas 1A, H220 Press. Gas (Liq.), H280
Isobutane (Component)	CAS-No.: 75-28-5 EC-No.: 200-857-2 EC Index-No.: 601-004-00-0 REACH-no: 01-2119485395-27	0.2	Flam. Gas 1A, H220 Press. Gas (Liq.), H280
2-methylbutane (Component)	CAS-No.: 78-78-4 EC-No.: 201-142-8 EC Index-No.: 601-085-00-2 REACH-no: 01-2119475602-38	0.05	Flam. Liq. 1, H224 STOT SE 3, H336 Asp. Tox. 1, H304 Aquatic Chronic 2, H411 EUH066

Contains no other components or impurities which will influence the classification of the product.

**1: Listed in Annex IV / V REACH, exempted from registration.*

**3: Registration not required: Substance manufactured or imported < 1t/y.*

Full text of H- and EUH-statements: see section 16

SECTION 4: First aid measures

4.1. Description of first aid measures

First-aid measures after inhalation : Remove victim to uncontaminated area wearing self contained breathing apparatus. Keep victim warm and rested. Call a doctor. Perform cardiopulmonary resuscitation if breathing stopped.

First-aid measures after skin contact : Adverse effects not expected from this product.

First-aid measures after eye contact : Adverse effects not expected from this product.

First-aid measures after ingestion : Ingestion is not considered a potential route of exposure.

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

Most important symptoms and effects, both acute and delayed

In high concentrations may cause asphyxiation. Symptoms may include loss of mobility/consciousness. Victim may not be aware of asphyxiation.
See section 11.

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

None.

SECTION 5: Firefighting measures

5.1. Extinguishing media

Suitable extinguishing media	:	Shutting off the source of the gas is the preferred method of control.
Unsuitable extinguishing media	:	Do not use water jet to extinguish.

5.2. Special hazards arising from the substance or mixture

Reactivity in case of fire	:	No reactivity hazard other than the effects described in sub-sections below.
Specific hazards	:	Exposure to fire may cause containers to rupture/explode.
Hazardous combustion products	:	Carbon monoxide.

5.3. Advice for firefighters

Specific methods	:	Do not extinguish a leaking gas flame unless absolutely necessary. Spontaneous/explosive re-ignition may occur. Extinguish any other fire. Use fire control measures appropriate for the surrounding fire. Exposure to fire and heat radiation may cause gas receptacles to rupture. Cool endangered receptacles with water spray jet from a protected position. Prevent water used in emergency cases from entering sewers and drainage systems. If possible, stop flow of product. Use water spray or fog to knock down fire fumes if possible. Move containers away from the fire area if this can be done without risk.
Special protective equipment for fire fighters	:	In confined space use self-contained breathing apparatus. Standard protective clothing and equipment (Self Contained Breathing Apparatus) for fire fighters. Standard EN 469 - Protective clothing for firefighters. Standard - EN 659: Protective gloves for firefighters. EN 15090 Footwear for firefighters. EN 443 Helmets for fire fighting in buildings and other structures. Standard EN 137 - Self-contained open-circuit compressed air breathing apparatus with full face mask.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

6.1.1. For non-emergency personnel

Emergency procedures	:	Act in accordance with local emergency plan. Try to stop release. Evacuate area. Eliminate ignition sources. Ensure adequate air ventilation. Stay upwind. See section 8 of the SDS for more information on personal protective equipment.

6.1.2. For emergency responders

Emergency procedures	:	Monitor concentration of released product. Consider the risk of potentially explosive atmospheres. Wear self-contained breathing apparatus when entering area unless atmosphere is proved to be safe. See section 5.3 of the SDS for more information.

6.2. Environmental precautions

Try to stop release.

6.3. Methods and material for containment and cleaning up

Methods and material for containment and cleaning up	:	Ventilate area.

6.4. Reference to other sections

See also sections 8 and 13.

SECTION 7: Handling and storage

7.1. Precautions for safe handling

Safe use of the product	:	Assess the risk of potentially explosive atmospheres and the need for explosion-proof equipment. Purge air from system before introducing gas. Take precautionary measures against static discharge. Keep away from ignition sources (including static discharges). Consider the use of only non-sparking tools. Ensure equipment is adequately earthed. The product must be handled in accordance with good industrial hygiene and safety procedures. Only experienced and properly instructed persons should handle gases under pressure. Consider pressure relief device(s) in gas installations. Ensure the complete gas system was (or is regularily) checked for leaks before use. Do not smoke while handling product. Use only properly specified equipment which is suitable for this product, its supply pressure and temperature. Contact your gas supplier if in doubt. Avoid suck back of water, acid and alkalis. Do not breathe gas. Avoid release of product into work area.
Safe handling of the gas receptacle	:	Refer to supplier's container handling instructions. Do not allow backfeed into the container. Protect containers from physical damage; do not drag, roll, slide or drop. When moving cylinders, even for short distances, use a cart (trolley, hand truck, etc.) designed to transport cylinders. Leave valve protection caps, when provided, in place until the container has been secured against either a wall or bench or placed in a container stand and is ready for use. If user experiences any difficulty operating valve discontinue use and contact supplier. Never attempt to repair or modify container valves or safety relief devices. Damaged valves should be reported immediately to the supplier. Keep container valve outlets clean and free from contaminants particularly oil and water. Replace valve outlet caps or plugs and container caps where supplied as soon as container is disconnected from equipment. Close container valve after each use and when empty, even if still connected to equipment. Never attempt to transfer gases from one cylinder/container to another. Never use direct flame or electrical heating devices to raise the pressure of a container. Do not remove or deface labels provided by the supplier for the identification of the content of the container. Suck back of water into the container must be prevented. Open valve slowly to avoid pressure shock.

7.2. Conditions for safe storage, including any incompatibilities

Conditions for safe storage, including any incompatibilities	:	Segregate from oxidant gases and other oxidants in store. All electrical equipment in the storage areas should be compatible with the risk of a potentially explosive atmosphere. Observe all regulations and local requirements regarding storage of containers. Containers should not be stored in conditions likely to encourage corrosion. Container valve guards or caps, when provided, should be in place. Containers should be stored in the vertical position and properly secured to prevent them from falling over. Stored containers should be periodically checked for general condition and leakage. Keep container below 50°C in a well ventilated place. Store containers in location free from fire risk and away from sources of heat and ignition. Keep away from combustible materials.

7.3. Specific end use(s)

None.

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

8.1.1 National occupational exposure and biological limit values

2-methylbutane (78-78-4)	
EU - Indicative Occupational Exposure Limit (IOEL)	
Local name	Isopentane
IOEL TWA	3000 mg/m³
	1000 ppm
Regulatory reference	COMMISSION DIRECTIVE 2006/15/EC
Austria - Occupational Exposure Limits	
Local name	Pentan (alle Isomere): Isopentan (2-Methylbutan)
MAK (OEL TWA)	1800 mg/m³
	600 ppm
MAK (OEL STEL)	3600 mg/m³ (3x 60(Mow) min)
	1200 ppm (3x 60(Mow) min)
Regulatory reference	BGBl. II Nr. 339/2025

butane (106-97-8)	
Austria - Occupational Exposure Limits	
Local name	Butan (beide Isomere): n-Butan (R 600)
MAK (OEL TWA)	1900 mg/m³
	800 ppm
MAK (OEL STEL)	3800 mg/m³ (3x 60(Mow) min)
	1600 ppm (3x 60(Mow) min)
Regulatory reference	BGBl. II Nr. 339/2025

Isobutane (75-28-5)	
Austria - Occupational Exposure Limits	
Local name	Butan (beide Isomere): Isobutan (2-Methylpropan) (R 600a)
MAK (OEL TWA)	1900 mg/m³
	800 ppm
MAK (OEL STEL)	3800 mg/m³ (3x 60(Mow) min)
	1600 ppm (3x 60(Mow) min)
Regulatory reference	BGBl. II Nr. 339/2025

Carbon dioxide (124-38-9)	
EU - Indicative Occupational Exposure Limit (IOEL)	
Local name	Carbon dioxide
IOEL TWA	9000 mg/m³
	5000 ppm
Regulatory reference	COMMISSION DIRECTIVE 2006/15/EC

Carbon dioxide (124-38-9)	
Austria - Occupational Exposure Limits	
Local name	Kohlenstoffdioxid
MAK (OEL TWA)	9000 mg/m³
	5000 ppm
MAK (OEL STEL)	18000 mg/m³ (3x 60(Mow) min)
	10000 ppm (3x 60(Mow) min)
Regulatory reference	BGBl. II Nr. 339/2025

Propane (74-98-6)	
Austria - Occupational Exposure Limits	
Local name	Propan (R 290)
MAK (OEL TWA)	1800 mg/m³
	1000 ppm
MAK (OEL STEL)	3600 mg/m³ (3x 60(Mow) min)
	2000 ppm (3x 60(Mow) min)
Regulatory reference	BGBl. II Nr. 339/2025

8.1.2. Recommended monitoring procedures

No additional information available

8.1.3. Air contaminants formed

No additional information available

DNEL and PNEC

C5H12 500 ppm; C4H10 2000 ppm; C4H10 2000 ppm;CO2 1,5 %; C3H8 2 %; N2 4 %; C2H6 8,2 %;CH4 83,85 %	
PNEC (additional information)	
Additional information	None established.

8.1.5. Control banding

No additional information available

8.2. Exposure controls

8.2.1. Appropriate engineering controls

Appropriate engineering controls:
Provide adequate general and local exhaust ventilation. Product to be handled in a closed system. Gas detectors should be used when flammable gases/vapours may be released. Consider the use of a work permit system e.g. for maintenance activities. Systems under pressure should be regularily checked for leakages. Ensure exposure is below occupational exposure limits (where available).

8.2.2. Personal protection equipment

Personal protective equipment:
A risk assessment should be conducted and documented in each work area to assess the risks related to the use of the product and to select the PPE that matches the relevant risk. The following recommendations should be considered: PPE compliant to the recommended EN/ISO standards should be selected.
Personal protective equipment symbol(s):

8.2.2.1. Eye and face protection

Eye protection:
Wear safety glasses with side shields. Standard EN 166 - Personal eye-protection - specifications, or
Standard EN ISO 16321-1 Eye and face protection for occupational use Part 1 : General requirements

8.2.2.2. Skin protection

Hand protection:
Wear working gloves when handling gas containers. Standard EN 388 - Protective gloves against mechanical risks, performance level 1 or higher. Recommended types include wrist gloves from leather or synthetic material with equivalent performance, fabric gloves, fabric gloves with leather palms.

Other skin protection
Consider the use of flame resistant anti-static safety clothing. Standard EN ISO 14116 - Limited flame spread materials. Standard EN 1149-5 - Protective clothing: Electrostatic properties. Wear safety shoes while handling containers. Standard EN ISO 20345 - Personal protective equipment - Safety footwear.

8.2.2.3. Respiratory protection

Respiratory protection:
Self contained breathing apparatus is recommended, where unknown exposure may be expected, e.g. during maintenance activities on installation systems. Consult respiratory device supplier´s product information for the selection of the appropriate device. Standard EN 137 - Self-contained open-circuit compressed air breathing apparatus with full face mask. When indicated by a risk assessment, Respiratory Protective Equipment must be used. The selection of the Respiratory Protective Device (RPD) must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected RPD.

8.2.2.4. Thermal hazards

Thermal hazard protection:
None in addition to the above sections.

8.2.3. Environmental exposure controls

Environmental exposure controls:
Refer to local regulations for restriction of emissions to the atmosphere. See section 13 for specific methods for waste gas treatment.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

Physical state	:	Gas
Colour	:	Colourless.
Form	:	Compressed gas
Odour	:	Odour threshold is subjective and inadequate to warn of overexposure. Mixture contains one or more component(s) which have the following odour: gasoline-like Stenchant often added. Sweetish.
Odour threshold	:	Odour threshold is subjective and inadequate to warn of overexposure.
Melting point	:	Not applicable for gases and gas mixtures.
Freezing point	:	Not applicable
Boiling point	:	Not applicable for gas mixtures. It is technically not possible to determine the boiling point or range of this mixture. Component with lowest boiling point: Nitrogen -196 °C
Flammability	:	Extremely flammable gas.
Oxidising properties	:	No oxidising properties.
Lower explosion limit	:	Calculated value: 4.17%
Upper explosion limit	:	No test data or calculation method available.
Flash point	:	Not applicable for gases and gas mixtures.
Auto-ignition temperature	:	Non flammable. Auto ignition temperature for mixtures is not available. Component with lowest auto-ignition temperature: butane 365 °C
Decomposition temperature	:	Not applicable.
pH	:	Not applicable for gases and gas mixtures.
Viscosity, kinematic	:	Not applicable for gases and gas mixtures.
Viscosity, dynamic	:	Not applicable for gases and gas mixtures.

Solubility in water	:	Mixture is partially soluble in water
Partition coefficient n-octanol/water (Log Kow)	:	Not available
Partition coefficient n-octanol/water (Log Pow)	:	Not applicable for gas mixtures.
Vapour pressure	:	Not applicable for compressed gases and gas mixtures.
Vapour pressure at 50°C	:	Not applicable for compressed gases and gas mixtures.
Density	:	Not applicable
Relative density	:	Not applicable
Relative vapour density at 20°C	:	Not applicable for gases and gas mixtures.
Relative gas density	:	Lighter or similar to air.
Particle characteristics	:	Not applicable Not applicable for gases and gas mixtures.

9.2. Other information

9.2.1. Information with regard to physical hazard classes

No additional information available

9.2.2. Other safety characteristics

Gas group	:	Compressed gas
Additional information	:	None.

2-methylbutane	
VOC content	620 g/l This chemical is a VOC according to 2004/42/EC DIRECTIVE 2010/75/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 24 November 2010 on industrial and lifestock emissions (integrated pollution prevention and control)

Propane	
VOC content	493 g/l This chemical is a VOC according to 2004/42/EC DIRECTIVE 2010/75/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 24 November 2010 on industrial and lifestock emissions (integrated pollution prevention and control)

SECTION 10: Stability and reactivity

10.1. Reactivity

Data for mixtures are not available.
This mixture contains components with the following reactivity : Can form explosive mixture with air. May react violently with oxidants.

10.2. Chemical stability

Stable under normal conditions.

10.3. Possibility of hazardous reactions

Can form explosive mixture with air. May react violently with oxidants.

10.4. Conditions to avoid

Keep away from heat/sparks/open flames/hot surfaces. – No smoking. Avoid moisture in installation systems.

10.5. Incompatible materials

Air, Oxidisers. For additional information on compatibility refer to ISO 11114.

10.6. Hazardous decomposition products

Under normal conditions of storage and use, hazardous decomposition products should not be produced.

SECTION 11: Toxicological information

11.1. Information on hazard classes as defined in Regulation (EC) No 1272/2008

Acute toxicity : Classification criteria are not met.
Acute toxicity (oral) : Not classified
Acute toxicity (dermal) : Not classified
Acute toxicity (inhalation) : Not classified

2-methylbutane (78-78-4)	
LD50 oral rat	> 2000 mg/kg bodyweight Animal: rat, Guideline: OECD Guideline 401 (Acute Oral Toxicity), Guideline: EU Method B.1 (Acute Toxicity (Oral))
LC50 Inhalation - Rat	> 25.3 mg/l air Animal: rat, Guideline: OECD Guideline 403 (Acute Inhalation Toxicity)

Isobutane (75-28-5)	
LC50 Inhalation - Rat [ppm]	> 800000 ppmv/4h

Propane (74-98-6)	
LC50 Inhalation - Rat [ppm]	20000 ppm/4h

Ethane (74-84-0)	
LC50 Inhalation - Rat [ppm]	> 80000 ppm

Skin corrosion/irritation : No known effects from this product.
pH: Not applicable for gases and gas mixtures.

butane (106-97-8)	
pH	Not applicable for gases and gas mixtures.

Isobutane (75-28-5)	
pH	Not applicable for gases and gas mixtures.

Carbon dioxide (124-38-9)	
pH	Not applicable for gases and gas mixtures.

Propane (74-98-6)	
pH	Not applicable for gases and gas mixtures.

Nitrogen (7727-37-9)	
pH	Not applicable for gases and gas mixtures.

Ethane (74-84-0)	
pH	Not applicable for gases and gas mixtures.

Methane (74-82-8)	
pH	Not applicable for gases and gas mixtures.

Serious eye damage/irritation : No known effects from this product.
pH: Not applicable for gases and gas mixtures.

butane (106-97-8)	
pH	Not applicable for gases and gas mixtures.

Isobutane (75-28-5)	
pH	Not applicable for gases and gas mixtures.

Carbon dioxide (124-38-9)	
pH	Not applicable for gases and gas mixtures.

Propane (74-98-6)	
pH	Not applicable for gases and gas mixtures.

Nitrogen (7727-37-9)	
pH	Not applicable for gases and gas mixtures.

Ethane (74-84-0)	
pH	Not applicable for gases and gas mixtures.

Methane (74-82-8)	
pH	Not applicable for gases and gas mixtures.

Respiratory or skin sensitisation : No known effects from this product.

Germ cell mutagenicity : No known effects from this product.

Carcinogenicity : No known effects from this product.

Reproductive toxicity : Not classified

Toxic for reproduction : Fertility : No known effects from this product.

Toxic for reproduction : unborn child : No known effects from this product.

Methane (74-82-8)	
Fertility NOAEC	3000, 9000 ppm
Teratogenicity NOAEC	9000 ppm

STOT-single exposure : Classification criteria are not met.

2-methylbutane (78-78-4)	
STOT-single exposure	May cause drowsiness or dizziness.

STOT-repeated exposure : No known effects from this product.

2-methylbutane (78-78-4)	
NOAEC (inhalation, rat, vapour, 90 days)	30 mg/l air Animal: rat, Guideline: OECD Guideline 413 (Subchronic Inhalation Toxicity: 90-Day Study), Guideline: other:, Guideline: EPA OTS 798.2450 (90-Day Inhalation Toxicity), Guideline: other:, Guideline: other:

Aspiration hazard : Not applicable for gases and gas mixtures.

C5H12 500 ppm; C4H10 2000 ppm; C4H10 2000 ppm;CO2 1,5 %; C3H8 2 %; N2 4 %; C2H6 8,2 %;CH4 83,85 %	
Viscosity, kinematic	Not applicable for gases and gas mixtures.

2-methylbutane (78-78-4)	
Viscosity, kinematic	0.345 mm²/s
Hydrocarbon	Yes

butane (106-97-8)	
Viscosity, kinematic	No reliable data available.
Hydrocarbon	Yes

Isobutane (75-28-5)	
Viscosity, kinematic	Not applicable for gases and gas mixtures.
Hydrocarbon	Yes

Carbon dioxide (124-38-9)	
Viscosity, kinematic	Not applicable for gases and gas mixtures.

Propane (74-98-6)	
Viscosity, kinematic	0.16 mm²/s
Hydrocarbon	Yes

Nitrogen (7727-37-9)	
Viscosity, kinematic	Not applicable for gases and gas mixtures.

Ethane (74-84-0)	
Viscosity, kinematic	0.179 mm²/s
Hydrocarbon	Yes

Methane (74-82-8)	
Viscosity, kinematic	No reliable data available.
Hydrocarbon	Yes

11.2. Information on other hazards

11.2.1. Endocrine disrupting properties

Adverse health effects caused by endocrine disrupting properties : The substance/mixture has no endocrine disrupting properties.

Other information

No additional information available

SECTION 12: Ecological information

12.1. Toxicity

Assessment : Classification criteria are not met.

Hazardous to the aquatic environment, short–term (acute) : Not classified

Hazardous to the aquatic environment, long–term (chronic) : Not classified

C5H12 500 ppm; C4H10 2000 ppm; C4H10 2000 ppm;CO2 1,5 %; C3H8 2 %; N2 4 %; C2H6 8,2 %;CH4 83,85 %	
LC50 96 h - Fish [mg/l]	No data available.
EC50 48h - Daphnia magna [mg/l]	No data available.
EC50 72h - Algae [mg/l]	No data available.

2-methylbutane (78-78-4)	
LC50 96 h - Fish [mg/l]	No data available.
EC50 - Crustacea [1]	2.3 mg/l (Exposure time: 48 h - Species: Daphnia magna)
EC50 48h - Daphnia magna [mg/l]	No data available.
EC50 72h - Algae [1]	10.7 mg/l
EC50 72h - Algae [mg/l]	No data available.
NOEC chronic algae	7.51 mg/l Species: Algae (Pseudokirchneriella subcapitata); Exp. Time: 72h

butane (106-97-8)	
LC50 96 h - Fish [mg/l]	24.1 mg/l
EC50 48h - Daphnia magna [mg/l]	14.2 mg/l
EC50 72h - Algae [mg/l]	7.7 mg/l

Isobutane (75-28-5)	
LC50 - Fish [1]	24.11 mg/l Species: Various; Method: QSAR; Remark: QSAR, Key study;
LC50 - Fish [2]	14.22 mg/l Species: Daphnid; Method: QSAR; Remark: QSAR; Exp. Time: 48h
LC50 96 h - Fish [mg/l]	24.11 - 147.54 mg/l
EC50 48h - Daphnia magna [mg/l]	14.22 - 69.43 mg/l
EC50 72h - Algae [mg/l]	7.71 - 19.37 mg/l

Carbon dioxide (124-38-9)	
LC50 96 h - Fish [mg/l]	No data available.
EC50 48h - Daphnia magna [mg/l]	No data available.
EC50 72h - Algae [mg/l]	No data available.

Propane (74-98-6)	
LC50 96 h - Fish [mg/l]	49.9 mg/l
EC50 48h - Daphnia magna [mg/l]	27.1 mg/l
EC50 72h - Algae [mg/l]	11.9 mg/l

Nitrogen (7727-37-9)	
LC50 96 h - Fish [mg/l]	No data available.
EC50 48h - Daphnia magna [mg/l]	No data available.
EC50 72h - Algae [mg/l]	No data available.

Ethane (74-84-0)	
LC50 96 h - Fish [mg/l]	24.11 - 147.54 mg/l
EC50 48h - Daphnia magna [mg/l]	7.02 - 69.43 mg/l
EC50 72h - Algae [mg/l]	7.71 - 16.5 mg/l

Methane (74-82-8)	
LC50 - Fish [1]	49.9 mg/l Species: Various; Method: QSAR; Remark: QSAR;
LC50 - Fish [2]	69.43 mg/l Species: Daphnia sp.; Remark: QSAR; Exp. Time: 48h
LC50 96 h - Fish [mg/l]	147.5 mg/l
EC50 48h - Daphnia magna [mg/l]	69.4 mg/l
EC50 72h - Algae [mg/l]	19.4 mg/l

12.2. Persistence and degradability

C5H12 500 ppm; C4H10 2000 ppm; C4H10 2000 ppm;CO2 1,5 %; C3H8 2 %; N2 4 %; C2H6 8,2 %;CH4 83,85 %	
Assessment	No data available.

2-methylbutane (78-78-4)	
Assessment	Rapidly degradable

butane (106-97-8)	
Assessment	The substance is readily biodegradable. Unlikely to persist.

Isobutane (75-28-5)	
Assessment	The substance is readily biodegradable. Unlikely to persist.

Carbon dioxide (124-38-9)	
Assessment	No ecological damage caused by this product.

Propane (74-98-6)	
Assessment	The substance is readily biodegradable. Unlikely to persist.

Nitrogen (7727-37-9)	
Assessment	No ecological damage caused by this product.

Ethane (74-84-0)	
Assessment	The substance is readily biodegradable. Unlikely to persist.

Methane (74-82-8)	
Assessment	The substance is readily biodegradable. Unlikely to persist.

12.3. Bioaccumulative potential

C5H12 500 ppm; C4H10 2000 ppm; C4H10 2000 ppm;CO2 1,5 %; C3H8 2 %; N2 4 %; C2H6 8,2 %;CH4 83,85 %	
Partition coefficient n-octanol/water (Log Pow)	Not applicable for gas mixtures.
Assessment	No data available.

2-methylbutane (78-78-4)	
Partition coefficient n-octanol/water (Log Pow)	4 (at 25 °C (at pH 6.6)

butane (106-97-8)	
Partition coefficient n-octanol/water (Log Pow)	Not applicable for gas mixtures.
Partition coefficient n-octanol/water (Log Kow)	2.89

Isobutane (75-28-5)	
Partition coefficient n-octanol/water (Log Pow)	Not applicable for gas mixtures.
Partition coefficient n-octanol/water (Log Kow)	2.76
Assessment	Not expected to bioaccumulate due to the low log Kow (log Kow < 4). See section 9.

Carbon dioxide (124-38-9)	
Partition coefficient n-octanol/water (Log Pow)	0.83
Partition coefficient n-octanol/water (Log Kow)	0.83
Assessment	No ecological damage caused by this product. Not expected to bioaccumulate due to the low log Kow (log Kow < 4). See section 9.

Propane (74-98-6)	
Partition coefficient n-octanol/water (Log Pow)	Not applicable for gas mixtures.
Partition coefficient n-octanol/water (Log Kow)	2.36

Nitrogen (7727-37-9)	
Partition coefficient n-octanol/water (Log Pow)	Not applicable for gas mixtures.
Partition coefficient n-octanol/water (Log Kow)	Not applicable for inorganic products.
Assessment	No ecological damage caused by this product.

Ethane (74-84-0)	
Partition coefficient n-octanol/water (Log Pow)	Not applicable for gas mixtures.
Partition coefficient n-octanol/water (Log Kow)	1.81

Methane (74-82-8)	
Partition coefficient n-octanol/water (Log Pow)	Not applicable for gas mixtures.
Partition coefficient n-octanol/water (Log Kow)	1.09

12.4. Mobility in soil

C5H12 500 ppm; C4H10 2000 ppm; C4H10 2000 ppm;CO2 1,5 %; C3H8 2 %; N2 4 %; C2H6 8,2 %;CH4 83,85 %	
Assessment	Because of its high volatility, the product is unlikely to cause ground or water pollution. Partition into soil is unlikely.

butane (106-97-8)	
Ecology - soil	Because of its high volatility, the product is unlikely to cause ground or water pollution. Partition into soil is unlikely.

Isobutane (75-28-5)	
Ecology - soil	Because of its high volatility, the product is unlikely to cause ground or water pollution. Partition into soil is unlikely.

Carbon dioxide (124-38-9)	
Ecology - soil	No ecological damage caused by this product.

Propane (74-98-6)	
Ecology - soil	Because of its high volatility, the product is unlikely to cause ground or water pollution. Partition into soil is unlikely.

Nitrogen (7727-37-9)	
Ecology - soil	No ecological damage caused by this product.

Ethane (74-84-0)	
Ecology - soil	Because of its high volatility, the product is unlikely to cause ground or water pollution. Partition into soil is unlikely.

Methane (74-82-8)	
Surface tension	14
Ecology - soil	Because of its high volatility, the product is unlikely to cause ground or water pollution. Partition into soil is unlikely.

12.5. Results of PBT and vPvB assessment

Assessment : Not classified as PBT or vPvB.

12.6. Endocrine disrupting properties

Adverse effects on the environment caused by endocrine disrupting properties : The substance/mixture has no endocrine disrupting properties.

Assessment : The substance/mixture has no endocrine disrupting properties.

12.7. Other adverse effects

Other adverse effects : No known effects from this product.

Effect on the ozone layer : No effect on the ozone layer.

Effect on global warming : Contains greenhouse gas(es).

SECTION 13: Disposal considerations

13.1. Waste treatment methods

Waste treatment methods : Contact supplier if guidance is required. Do not discharge into areas where there is a risk of forming an explosive mixture with air. Waste gas should be flared through a suitable burner with flash back arrestor. Ensure that the emission levels from local regulations or operating permits are not exceeded. Refer to the EIGA code of practice Doc.30 "Disposal of Gases", downloadable at http://www.eiga.eu for more guidance on suitable disposal methods. Do not discharge into any place where its accumulation could be dangerous. Return unused product in original container to supplier.

List of hazardous waste codes (from Commission Decision 2000/532/EC as amended) : 16 05 04 *: Gases in pressure containers (including halons) containing hazardous substances.

Additional information : External treatment and disposal of waste should comply with applicable local and/or national regulations.

13.2. Additional information

External treatment and disposal of waste should comply with applicable local and/or national regulations.

SECTION 14: Transport information

In accordance with ADR / IMDG / IATA / ADN / RID

ADR	IMDG	IATA	ADN	RID
14.1. UN number or ID number				
UN 1954	UN 1954	UN 1954	UN 1954	UN 1954
14.2. UN proper shipping name				
COMPRESSED GAS, FLAMMABLE, N.O.S. (Methane, Ethane)	COMPRESSED GAS, FLAMMABLE, N.O.S. (Methane, Ethane)	Compressed gas, flammable, n.o.s. (Methane, Ethane)	COMPRESSED GAS, FLAMMABLE, N.O.S. (Methane, Ethane)	COMPRESSED GAS, FLAMMABLE, N.O.S. (Methane, Ethane)
Transport document description				
UN 1954 COMPRESSED GAS, FLAMMABLE, N.O.S. (Methane, Ethane), 2.1, (B/D)	UN 1954 COMPRESSED GAS, FLAMMABLE, N.O.S. (Methane, Ethane), 2.1	UN 1954 Compressed gas, flammable, n.o.s. (Methane, Ethane), 2.1	UN 1954 COMPRESSED GAS, FLAMMABLE, N.O.S. (Methane, Ethane), 2.1	UN 1954 COMPRESSED GAS, FLAMMABLE, N.O.S. (Methane, Ethane), 2.1
14.3. Transport hazard class(es)				
2.1	2.1	2.1	2.1	2.1
				

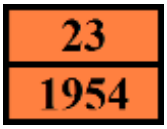
ADR	IMDG	IATA	ADN	RID
14.4. Packing group				
Not applicable	Not applicable	Not applicable	Not applicable	Not applicable
14.5. Environmental hazards				
Dangerous for the environment: No	Dangerous for the environment: No Marine pollutant: No EmS-No. (Fire): F-D EmS-No. (Spillage): S-U	Dangerous for the environment: No	Dangerous for the environment: No	Dangerous for the environment: No
No supplementary information available				

14.6. Special precautions for user

Special transport precautions : Avoid transport on vehicles where the load space is not separated from the driver's compartment, Ensure vehicle driver is aware of the potential hazards of the load and knows what to do in the event of an accident or an emergency, Before transporting product containers: - Ensure there is adequate ventilation, - Ensure that containers are firmly secured, - Ensure valve is closed and not leaking, - Ensure valve outlet cap nut or plug (where provided) is correctly fitted, - Ensure valve protection device (where provided) is correctly fitted.

Overland transport

Classification code (ADR) : 1F
Special provisions (ADR) : 274, 392, 662
Limited quantities (ADR) : 0
Excepted quantities (ADR) : E0
Packing instructions (ADR) : P200
Vehicle for tank carriage : FL
Transport category (ADR) : 2
Hazard identification number (Kemler No.) : 23
Orange plates :



Tunnel restriction code (ADR) : B/D

Transport by sea

Special provisions (IMDG) : 274, 392
Limited quantities (IMDG) : 0
Excepted quantities (IMDG) : E0
Packing instructions (IMDG) : P200
Stowage category (IMDG) : D

Air transport

PCA Excepted quantities (IATA) : E0
PCA Limited quantities (IATA) : FORBIDDEN
PCA limited quantity max net quantity (IATA) : FORBIDDEN
PCA packing instructions (IATA) : FORBIDDEN
PCA max net quantity (IATA) : FORBIDDEN
CAO packing instructions (IATA) : 200
CAO max net quantity (IATA) : 150kg
Special provisions (IATA) : A1, A807
ERG code (IATA) : 10L

Inland waterway transport

Classification code (ADN) : 1F
Special provisions (ADN) : 274, 392, 662

Limited quantities (ADN)	:	0
Excepted quantities (ADN)	:	E0
Equipment required (ADN)	:	PP, EX, A
Ventilation (ADN)	:	VE01
Number of blue cones/lights (ADN)	:	1

Rail transport

Classification code (RID)	:	1F
Special provisions (RID)	:	274, 392, 662
Limited quantities (RID)	:	0
Excepted quantities (RID)	:	E0
Packing instructions (RID)	:	P200
Mixed packing provisions (RID)	:	MP9
Portable tank and bulk container instructions (RID)	:	(M)
Tank codes for RID tanks (RID)	:	CxBN(M)
Special provisions for RID tanks (RID)	:	TU38, TE22, TA4, TT9
Transport category (RID)	:	2
Special provisions for carriage - Loading, unloading and handling (RID)	:	CW9, CW10, CW36
Colis express (express parcels) (RID)	:	CE3
Hazard identification number (RID)	:	23

14.7. Maritime transport in bulk according to IMO instruments

IBC code : Not applicable.

SECTION 15: Regulatory information

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

EU-Regulations

REACH Annex XVII (Restriction List)

EU restriction list (REACH Annex XVII)

Reference code	Applicable on	Entry title or description
3(a)	2-methylbutane	Substances or mixtures fulfilling the criteria for any of the following hazard classes or categories set out in Annex I to Regulation (EC) No 1272/2008: Hazard classes 2.1 to 2.4, 2.6 and 2.7, 2.8 types A and B, 2.9, 2.10, 2.12, 2.13 categories 1 and 2, 2.14 categories 1 and 2, 2.15 types A to F
3(b)	2-methylbutane	Substances or mixtures fulfilling the criteria for any of the following hazard classes or categories set out in Annex I to Regulation (EC) No 1272/2008: Hazard classes 3.1 to 3.6, 3.7 adverse effects on sexual function and fertility or on development, 3.8 effects other than narcotic effects, 3.9 and 3.10
3(c)	2-methylbutane	Substances or mixtures fulfilling the criteria for any of the following hazard classes or categories set out in Annex I to Regulation (EC) No 1272/2008: Hazard class 4.1
40.	2-methylbutane ; butane ; Isobutane ; Propane ; Ethane ; Methane	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 Regulation (EC) No 1272/2008 or not.

REACH Annex XIV (Authorisation List)

Contains no substance(s) listed on REACH Annex XIV (Authorisation List)

REACH Candidate List (SVHC)

Contains no substance(s) listed on the REACH Candidate List

PIC Regulation (Prior Informed Consent)

Contains no substance(s) listed on the PIC list (Regulation EU 649/2012 concerning the export and import of hazardous chemicals)

POP Regulation (Persistent Organic Pollutants)

Contains no substance(s) listed on the POP list (Regulation EU 2019/1021 on persistent organic pollutants)

Ozone Regulation (2024/590)

Contains no substance(s) listed on the Ozone Depletion list (Regulation EU 2024/590 on substances that deplete the ozone layer)

Council Regulation (EC) for the control of dual-use items

Contains no substance subject to the COUNCIL REGULATION (EC) for the control of dual-use items

VOC Directive (2004/42)

Restrictions on use :

Seveso Directive (Disaster Risk Reduction)

Seveso Directive : 2012/18/EU (Seveso III) : Covered.

Seveso III Part I (Categories of dangerous substances)	Qualifying quantity (tonnes)	
	Lower-tier	Upper-tier
P2 FLAMMABLE GASES Flammable gases, Category 1 or 2	10	50

Explosives Precursors Regulation (EU 2019/1148)

Contains no substance(s) listed on the Explosives Precursors list (Regulation EU 2019/1148 on the marketing and use of explosives precursors)
Please see https://home-affairs.ec.europa.eu/policies/internal-security/counter-terrorism-and-radicalisation/protection/legislation-chemicals-used-home-made-explosives_en

Drug Precursors Regulation (EC 273/2004)

Not applicable.

15.1.2. National regulations

Ensure all national/local regulations are observed.
Safety data sheet in accordance with commission regulation (EU) No 2020/878.
Council Directive 89/391/EEC on the introduction of measures to encourage improvements in the safety and health of workers at work
Directive 2016/425/EEC on personal protective equipment
Directive 2014/34/EU on equipment and protective systems intended for use in potentially explosive atmospheres (ATEX)
Only products that comply with the food regulations (EC) No. 1333/2008 and (EU) No. 231/2012 and are labelled as such may be used as food additives.
This Safety Data Sheet has been produced to comply with Regulation (EU) 2015/830.

15.2. Chemical safety assessment

A CSA does not need to be carried out for this product.

For the following substances of this mixture a chemical safety assessment has been carried out:
Ethane

SECTION 16: Other information

Indication of changes:
Safety data sheet in accordance with commission regulation (EU) No 2020/878.

Abbreviations and acronyms:	
ADN	European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterways
ADR	European Agreement concerning the International Carriage of Dangerous Goods by Road
ATE	Acute Toxicity Estimate
BLV	Biological limit value

Abbreviations and acronyms:	
BOD	Biochemical oxygen demand (BOD)
CAO	Cargo Aircraft only / Cargo Aircraft only
CLP	Classification Labelling Packaging Regulation; Regulation (EC) No 1272/2008
CAS-No.	Chemical Abstracts Service number
COD	Chemical oxygen demand (COD)
DMEL	Derived Minimal Effect level
DNEL	Derived-No Effect Level
EC50	Median effective concentration
EC	European Inventory of Existing Commercial Chemical Substances
ED	Endocrine disruptor
EN	European Standard
IARC	International Agency for Research on Cancer
IATA	International Air Transport Association
IMDG	International Maritime Dangerous Goods
IOELV	Indicative Occupational Exposure Limit Value
LC50	Median lethal concentration
LD50	Median lethal dose
LOAEL	Lowest Observed Adverse Effect Level
NOAEC	No-Observed Adverse Effect Concentration
NOAEL	No-Observed Adverse Effect Level
NOEC	No-Observed Effect Concentration
N.O.S.	Not Otherwise Specified
OECD	Organisation for Economic Co-operation and Development
OEL	Occupational Exposure Limit
PBT	Persistent Bioaccumulative Toxic
PCA	Passenger and Cargo Aircraft / Passenger and Cargo Aircraft
PNEC	Predicted No-Effect Concentration
REACH	Registration, Evaluation, Authorisation and Restriction of Chemicals Regulation (EC) No 1907/2006
RID	Regulations concerning the International Carriage of Dangerous Goods by Rail
STP	Sewage treatment plant
ThOD	Theoretical oxygen demand (ThOD)
TLM	Median Tolerance Limit
TRGS	Technical Rules for Hazardous Substances
STOT-RE	Specific Target Organ Toxicity-Repeated Exposure
STOT-SE	Specific Target Organ Toxicity-Single Exposure
UFI	Unique Formula Identifier
VOC	Volatile Organic Compounds
vPvB	Very Persistent and Very Bioaccumulative

Abbreviations and acronyms:	
WGK	Water Hazard Class
MiM	Mixture in Mixture [MiM]
MAK	maximum workplace concentration
vPvM	Very persistent and very mobile
PMT	Persistent, mobile and toxic
IARC	International Agency for Research on Cancer
JArbSchG	Act on the Protection of Young People in Employment (JArbSchG)
MuSchG	Act on the Protection of Working Mothers (MuSchG)
TALuft	Technical Instructions on Air Quality Control (TA Luft)
VbF	Ordinance on Flammable Liquids (VbF)
TWA	Time Weighted Average
TLV	Threshold Limit Value
RMM	Risk Management Measures
ThOD	Theoretical oxygen demand (ThOD)
PPE	Personal protective equipment
EWC	European waste catalogue

Training advice : Ensure operators understand the flammability hazard.

Other information : Classification using data from databases maintained by the European Industrial Gases Association (EIGA). Data is maintained in EIGA Doc 169 : 'Classification and Labelling Guide', downloadable at : http://www.eiga.eu. Classification in accordance with the procedures and calculation methods of Regulation (EC) 1272/2008 (CLP).

Full text of H- and EUH-statements:	
Aquatic Chronic 2	Hazardous to the aquatic environment – Chronic Hazard, Category 2
Asp. Tox. 1	Aspiration hazard, Category 1
Flam. Gas 1A	Flammable gases, Category 1A
Flam. Liq. 1	Flammable liquids, Category 1
Press. Gas (Comp.)	Gases under pressure : Compressed gas
Press. Gas (Liq.)	Gases under pressure : Liquefied gas
STOT SE 3	Specific target organ toxicity – Single exposure, Category 3, Narcosis
H220	Extremely flammable gas.
H224	Extremely flammable liquid and vapour.
H280	Contains gas under pressure; may explode if heated.
H304	May be fatal if swallowed and enters airways.
H336	May cause drowsiness or dizziness.
H411	Toxic to aquatic life with long lasting effects.
EUH066	Repeated exposure may cause skin dryness or cracking.

The classification complies with : ATP 12

DISCLAIMER OF LIABILITY	:	Before using this product in any new process or experiment, a thorough material compatibility and safety study should be carried out. Details given in this document are believed to be correct at the time of going to press. Whilst proper care has been taken in the preparation of this document, no liability for injury or damage resulting from its use can be accepted.

Safety Data Sheet (SDS), EU AT

This information is based on our current knowledge and is intended to describe the product for the purposes of health, safety and environmental requirements only. It should not therefore be construed as guaranteeing any specific property of the product.

End of document