

SAFETY DATA SHEET
Natural Gas, compressed.

Issue Date: 10.07.2013
Last revised date: 11.07.2016

Version: 1. 3

SDS No.: 000010021935
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Precautionary Statement

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: Eliminate all ignition sources if safe to do so.

Storage: P403: Store in a well-ventilated place.

Disposal: None.

2.3 Other hazards: None.

SECTION 3: Composition/information on ingredients

3.2 Mixtures

Chemical name	Chemical formula	Concentration	CAS-No.	EC No.	REACH Registration No.	Notes
ethane	C2H6	3.5%	74-84-0	200-814-8	01-2119486765-21	
propane	C3H8	7,000PPM	74-98-6	200-827-9	01-2119486944-21	
Butane	C4H10	1,200PPM	106-97-8	203-448-7	01-2119474691-32	#
Isobutane	C4H10	1,000PPM	75-28-5	200-857-2	01-2119485395-27	
pentane	C5H12	350PPM	109-66-0	203-692-4	01-2119459286-30	#
isopentane; 2-methylbutane	C5H12	350PPM	78-78-4	201-142-8	01-2119475602-38	#
n-hexane	C6H14	300PPM	110-54-3	203-777-6	01-2119480412-44	#
heptane; n-heptane	C7H16	200PPM	142-82-5	205-563-8	01-2119457603-38	#
octane; n-octane	C8H18	100PPM	111-65-9	203-892-1	01-2119463939-19	
Nonane	C9H20	50PPM	111-84-2	203-913-4	01-2119463259-31	
benzene	C6H6	200PPM	71-43-2	200-753-7	01-2119447106-44	#
toluene	C7H8	70PPM	108-88-3	203-625-9	01-2119471310-51	#
Nitrogen	N2	1.5%	7727-37-9	231-783-9	Listed in Annex IV/V of Regulation (EC) No 1907/2006 (REACH), exempted from registration.	
Carbon dioxide	CO2	5,000PPM	124-38-9	204-696-9	Listed in Annex IV/V of Regulation (EC) No 1907/2006 (REACH), exempted from registration.	#
Helium	He	300PPM	7440-59-7	231-168-5	Listed in Annex IV/V of Regulation (EC) No 1907/2006 (REACH), exempted from registration.	
methane	CH4	93.3880%	74-82-8	200-812-7	01-2119474442-39	

The concentrations of the components in the SDS header, product name on page one and in section 3.2 are in mol due to regulatory requirements. All concentrations are nominal.

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This substance has workplace exposure limit(s).
PBT: persistent, bioaccumulative and toxic substance.
vPvB: very persistent and very bioaccumulative substance.

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Classification

Chemical name	Classification		Notes
ethane	DSD:	F+; R12	
	CLP:	Flam. Gas 1;H220, Press. Gas Liquef. Gas;H280	
propane	DSD:	F+; R12	
	CLP:	Flam. Gas 1;H220, Press. Gas Liquef. Gas;H280	
Butane	DSD:	F+; R12	
	CLP:	Flam. Gas 1;H220, Press. Gas Liquef. Gas;H280	
Isobutane	DSD:	F+; R12	
	CLP:	Flam. Gas 1;H220, Press. Gas Liquef. Gas;H280	
pentane	DSD:	F+; R12 Xn; R65 R66 R67 N; R51/53	
	CLP:	Asp. Tox. 1;H304, STOT SE 3;H336, Aquatic Chronic 2;H411, Flam. Liq. 1;H224	Note C
isopentane; 2-methylbutane	DSD:	F+; R12 Xn; R65 R66 R67 N; R51/53	
	CLP:	Flam. Liq. 1;H224, Asp. Tox. 1;H304, STOT SE 3;H336, Aquatic Chronic 2;H411	
n-hexane	DSD:	F; R11 Repr. 3; R62 Xi; R38 Xn; R65, R48/20 R67 N; R51/53	
	CLP:	Flam. Liq. 2;H225, Repr. 2;H361f, STOT RE 2;H373, Asp. Tox. 1;H304, Skin Irrit. 2;H315, STOT SE 3;H336, Aquatic Chronic 2;H411	
heptane; n-heptane	DSD:	F; R11 Xi; R38 Xn; R65 R67 N; R50/53	
	CLP:	Flam. Liq. 2;H225, Asp. Tox. 1;H304, Skin Irrit. 2;H315, STOT SE 3;H336, Aquatic Acute 1;H400, Aquatic Chronic 1;H410	Note C
octane; n-octane	DSD:	F; R11 Xi; R38 Xn; R65 R67 N; R50/53	
	CLP:	Flam. Liq. 2;H225, Asp. Tox. 1;H304, Skin Irrit. 2;H315, STOT SE 3;H336, Aquatic Acute 1;H400, Aquatic Chronic 1;H410	Note C
Nonane	DSD:	F; R10 Xn; R65 R67 Xi; R38 N; R50/53	
	CLP:	Flam. Liq. 3; Skin Corr. 2; Asp. Tox. 1; STOT SE 3; Aquatic Chronic 1; Aquatic Acute 1;	
benzene	DSD:	F; R11 Carc. 1; R45 Muta. 2; R46 Xi; R36/38 T; R48/23/24/25 Xn; R65	
	CLP:	Flam. Liq. 2;H225, Carc. 1A;H350, Muta. 1B;H340, STOT RE 1;H372, Asp. Tox. 1;H304, Eye Irrit. 2;H319, Skin Irrit. 2;H315	Note E
toluene	DSD:	F; R11 Repr. 3; R63 Xi; R38 Xn; R48/20, R65 R67	
	CLP:	Flam. Liq. 2;H225, Repr. 2;H361d, STOT RE 2;H373, Asp. Tox. 1;H304, Skin Irrit. 2;H315, STOT SE 3;H336	
Nitrogen	DSD:	none	
	CLP:	Press. Gas Compr. Gas;H280	
Carbon dioxide	DSD:	none	
	CLP:	Press. Gas Liquef. Gas;H280	
Helium	DSD:	none	
	CLP:	Press. Gas Compr. Gas;H280	

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methane	DSD:	F+; R12	
	CLP:	Flam. Gas 1;H220, Press. Gas Compr. Gas;H280	Note U

DSD: Directive 67/548/EEC.

CLP: Regulation No. 1272/2008.

Note C: Some organic substances may be marketed either in a specific isomeric form or as a mixture of several isomers. In this case the supplier must state on the label whether the substance is a specific isomer or a mixture of isomers.

Note C: Some organic substances may be marketed either in a specific isomeric form or as a mixture of several isomers. In this case the supplier must state on the label whether the substance is a specific isomer or a mixture of isomers.

Note E: Note is not defined in the proposal.

Note U: When put on the market gases have to be classified as 'Gases under pressure', in one of the groups compressed gas, liquefied gas, refrigerated liquefied gas or dissolved gas. The group depends on the physical state in which the gas is packaged and therefore has to be assigned case by case.

The full text for all R-phrases and H-statements is displayed in section 16.

SECTION 4: First Aid Measures

General: In high concentrations may cause asphyxiation. Symptoms may include loss of mobility/consciousness. Victim may not be aware of asphyxiation. Remove victim to uncontaminated area wearing self contained breathing apparatus. Keep victim warm and rested. Call a doctor. Apply artificial respiration if breathing stopped.

4.1 Description of first aid measures

Inhalation: In high concentrations may cause asphyxiation. Symptoms may include loss of mobility/consciousness. Victim may not be aware of asphyxiation. Remove victim to uncontaminated area wearing self contained breathing apparatus. Keep victim warm and rested. Call a doctor. Apply artificial respiration if breathing stopped. Low concentrations of CO2 cause increased respiration and headache.

Eye contact: Adverse effects not expected from this product.

Skin Contact: Adverse effects not expected from this product.

Ingestion: Ingestion is not considered a potential route of exposure.

4.2 Most important symptoms and effects, both acute and delayed: Respiratory arrest.

4.3 Indication of any immediate medical attention and special treatment needed

Hazards: None.

Treatment: None.

SECTION 5: Firefighting Measures

General Fire Hazards: Heat may cause the containers to explode.

5.1 Extinguishing media

Suitable extinguishing media: Water. Dry powder. Foam.

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Unsuitable extinguishing media: Carbon dioxide.

5.2 Special hazards arising from the substance or mixture: Incomplete combustion may form carbon monoxide

5.3 Advice for firefighters

Special fire fighting procedures: In case of fire: Stop leak if safe to do so. Do not extinguish flames at leak because possibility of uncontrolled explosive re-ignition exists. Continue water spray from protected position until container stays cool. Use extinguishants to contain the fire. Isolate the source of the fire or let it burn out.

Special protective equipment for firefighters: Firefighters must use standard protective equipment including flame retardant coat, helmet with face shield, gloves, rubber boots, and in enclosed spaces, SCBA. Guideline: EN 469 Protective clothing for firefighters. Performance requirements for protective clothing for firefighting. EN 15090 Footwear for firefighters. EN 659 Protective gloves for firefighters. EN 443 Helmets for fire fighting in buildings and other structures. EN 137 Respiratory protective devices - Self-contained open-circuit compressed air breathing apparatus with full face mask - Requirements, testing, marking.

SECTION 6: Accidental Release Measures

6.1 Personal precautions, protective equipment and emergency procedures: Evacuate area. Provide adequate ventilation. Consider the risk of potentially explosive atmospheres . Eliminate all ignition sources if safe to do so. Monitor the concentration of the released product. Prevent from entering sewers, basements and workpits, or any place where its accumulation can be dangerous. Wear self-contained breathing apparatus when entering area unless atmosphere is proved to be safe. EN 137 Respiratory protective devices - Self-contained open-circuit compressed air breathing apparatus with full face mask - Requirements, testing, marking.

6.2 Environmental Precautions: Prevent further leakage or spillage if safe to do so.

6.3 Methods and material for containment and cleaning up: Provide adequate ventilation. Eliminate sources of ignition.

6.4 Reference to other sections: Refer to sections 8 and 13.

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SECTION 7: Handling and Storage:

7.1 Precautions for safe handling:

Only experienced and properly instructed persons should handle gases under pressure. Use only properly specified equipment which is suitable for this product, its supply pressure and temperature. Purge system with dry inert gas (e.g. helium or nitrogen) before gas is introduced and when system is placed out of service. Purge air from system before introducing gas. Containers, which contain or have contained flammable or explosive substances, must not be inerted with liquid carbon dioxide. Assess the risk of a potentially explosive atmosphere and the need for suitable equipment i.e. explosion-proof. Take precautionary measures against static discharges. Keep away from ignition sources (including static discharges). Provide electrical earthing of equipment and electrical equipment usable in explosive atmospheres. Use only non-sparking tools. Refer to supplier's handling instructions. The substance must be handled in accordance with good industrial hygiene and safety procedures. Ensure the complete system has been (or is regularly) checked for leaks before use. Protect containers from physical damage; do not drag, roll, slide or drop. Do not remove or deface labels provided by the supplier for the identification of the container contents. When moving containers, even for short distances, use appropriate equipment eg. trolley, hand truck, fork truck etc. Secure cylinders in an upright position at all times, close all valves when not in use. Provide adequate ventilation. Suck back of water into the container must be prevented. Do not allow backfeed into the container. Avoid suckback of water, acid and alkalis. Keep container below 50°C in a well ventilated place. Observe all regulations and local requirements regarding storage of containers. When using do not eat, drink or smoke. Store in accordance with local/regional/national/international regulations. Never use direct flame or electrical heating devices to raise the pressure of a container. Leave valve protection caps 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. Damaged valves should be reported immediately to the supplier. Close container valve after each use and when empty, even if still connected to equipment. Never attempt to repair or modify container valves or safety relief devices. Replace valve outlet caps or plugs and container caps where supplied as soon as container is disconnected from equipment. Keep container valve outlets clean and free from contaminants particularly oil and water. If user experiences any difficulty operating container valve discontinue use and contact supplier. Never attempt to transfer gases from one container to another. Container valve guards or caps should be in place.

**7.2 Conditions for safe storage,
including any incompatibilities:**

All electrical equipment in the storage areas should be compatible with the risk of a potentially explosive atmosphere. Segregate from oxidant gases and other oxidants being stored. Containers should not be stored in conditions likely to encourage corrosion. Stored containers should be periodically checked for general conditions and leakage. Container valve guards or caps should be in place. Store containers in location free from fire risk and away from sources of heat and ignition. Keep away from combustible material.

7.3 Specific end use(s):

None.

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SECTION 8: Exposure Controls/Personal Protection

8.1 Control Parameters

Occupational Exposure Limits

Chemical name	type	Exposure Limit Values	Source
Carbon dioxide	TWA	5,000 ppm 9,150 mg/m3	UK. EH40 Workplace Exposure Limits (WELs) (12 2011)
	STEL	15,000 ppm 27,400 mg/m3	UK. EH40 Workplace Exposure Limits (WELs) (12 2011)
Butane	TWA	5,000 ppm 9,000 mg/m3	EU. Indicative Exposure Limit Values in Directives 91/322/EEC, 2000/39/EC, 2006/15/EC, 2009/161/EU (12 2009)
	TWA	600 ppm 1,450 mg/m3	UK. EH40 Workplace Exposure Limits (WELs) (12 2011)
pentane	STEL	750 ppm 1,810 mg/m3	UK. EH40 Workplace Exposure Limits (WELs) (12 2011)
	TWA	600 ppm 1,800 mg/m3	UK. EH40 Workplace Exposure Limits (WELs) (12 2011)
isopentane; 2-methylbutane	TWA	1,000 ppm 3,000 mg/m3	EU. Indicative Exposure Limit Values in Directives 91/322/EEC, 2000/39/EC, 2006/15/EC, 2009/161/EU (12 2009)
	TWA	600 ppm 1,800 mg/m3	UK. EH40 Workplace Exposure Limits (WELs) (12 2011)
n-hexane	TWA	1,000 ppm 3,000 mg/m3	EU. Indicative Exposure Limit Values in Directives 91/322/EEC, 2000/39/EC, 2006/15/EC, 2009/161/EU (12 2009)
	TWA	20 ppm 72 mg/m3	UK. EH40 Workplace Exposure Limits (WELs) (12 2011)
heptane; n-heptane	TWA	20 ppm 72 mg/m3	EU. Indicative Exposure Limit Values in Directives 91/322/EEC, 2000/39/EC, 2006/15/EC, 2009/161/EU (12 2009)
	TWA	500 ppm	UK. EH40 Workplace Exposure Limits (WELs) (2007)
benzene	TWA	500 ppm 2,085 mg/m3	UK. EH40 Workplace Exposure Limits (WELs) (12 2011)
	TWA	500 ppm 2,085 mg/m3	EU. Indicative Exposure Limit Values in Directives 91/322/EEC, 2000/39/EC, 2006/15/EC, 2009/161/EU (12 2009)
toluene	TWA	1 ppm	UK. EH40 Workplace Exposure Limits (WELs) (2007)
	TWA	1 ppm 3.25 mg/m3	UK. EH40 Workplace Exposure Limits (WELs) (12 2011)
toluene	TWA	1 ppm 3.25 mg/m3	EU. OELs, Directive 2004/37/EC on carcinogen and mutagens from Annex III, Part A (08 2007)
	TWA	50 ppm 191 mg/m3	UK. EH40 Workplace Exposure Limits (WELs) (12 2011)
toluene	STEL	100 ppm 384 mg/m3	UK. EH40 Workplace Exposure Limits (WELs) (12 2011)
	TWA	50 ppm 192 mg/m3	EU. Indicative Exposure Limit Values in Directives 91/322/EEC, 2000/39/EC,

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			2006/15/EC, 2009/161/EU (12 2009)
	STEL	100 ppm 384 mg/m3	EU. Indicative Exposure Limit Values in Directives 91/322/EEC, 2000/39/EC, 2006/15/EC, 2009/161/EU (12 2009)

DNEL-Values

Critical component	type	Value	Remarks
pentane	Worker - inhalative, long-term - systemic	3000 mg/m3	-
	Worker - dermal, long-term - systemic	432 mg/kg bw/day	-
isopentane; 2-methylbutane	Worker - inhalative, long-term - systemic	3000 mg/m3	-
	Worker - dermal, long-term - systemic	432 mg/kg bw/day	-
n-hexane	Worker - inhalative, long-term - systemic	75 mg/m3	-
	Worker - dermal, long-term - systemic	11 mg/kg bw/day	-

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PNEC-Values

Critical component	type	Value	Remarks
pentane	Aquatic (freshwater)	230 µg/l	-
	Soil	0.55 mg/kg	-
	Sediment (marine water)	1.2 mg/kg	-
	Sewage treatment plant	3600 µg/l	-
	Sediment (freshwater)	1.2 mg/kg	-
	Aquatic (marine water)	230 µg/l	-
	Aquatic (intermit. releases)	880 µg/l	-
octane; n-octane	Aquatic (marine water)	10 µg/l	-
	Aquatic (freshwater)	10 µg/l	-
	Soil	1.6 mg/kg	-
	Sewage treatment plant	160 µg/l	-
	Sediment (marine water)	4 mg/kg	-
	Aquatic (intermit. releases)	40 µg/l	-
	Sediment (freshwater)	4 mg/kg	-
Nonane	Aquatic (marine water)	3.6 µg/l	-
	Sediment (marine water)	0.62 mg/kg	-
	Aquatic (intermit. releases)	14 µg/l	-
	Aquatic (freshwater)	3.6 µg/l	-
	Sewage treatment plant	54 µg/l	-
	Sediment (freshwater)	0.62 mg/kg	-
	Soil	0.25 mg/kg	-
benzene	Aquatic (intermit. releases)	1.9 mg/l	-
	Sediment (marine water)	33 mg/kg	-
	Sediment (freshwater)	33 mg/kg	-
	Soil	4.8 mg/kg	-
	Aquatic (freshwater)	1.9 mg/l	-
	Aquatic (marine water)	1.9 mg/l	-
	Sewage treatment plant	39 mg/l	-
toluene	Sediment (freshwater)	16.39 mg/kg	-
	Sediment (marine water)	16.39 mg/kg	-
	Soil	2.89 mg/kg	-
	Aquatic (marine water)	0.68 mg/l	-
	Sewage treatment plant	13.61 mg/l	-
	Aquatic (intermit. releases)	0.68 mg/l	-
	Aquatic (freshwater)	0.68 mg/l	-

8.2 Exposure controls

Appropriate engineering controls:

Consider a work permit system e.g. for maintenance activities. Ensure adequate air ventilation. Provide adequate general and local exhaust ventilation. Keep concentrations well below lower explosion limits. Gas detectors should be used when quantities of flammable gases or vapours may be released. Provide adequate ventilation, including appropriate local extraction, to ensure that the defined occupational exposure limit is not exceeded. Systems under pressure should be regularly checked for leakages. Product to be handled in a closed system. Use only permanent leak tight installations (e.g. welded pipes). Take precautionary measures against static discharges.

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Individual protection measures, such as personal protective equipment

General information:	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. Keep self contained breathing apparatus readily available for emergency use. Personal protective equipment for the body should be selected based on the task being performed and the risks involved. Refer to local regulations for restriction of emissions to the atmosphere. See section 13 for specific methods for waste gas treatment. Do not eat, drink or smoke when using the product.
Eye/face protection:	Wear eye protection to EN 166 when using gases. Guideline: EN 166 Personal Eye Protection.
Skin protection	
Hand Protection:	Wear working gloves while handling containers Guideline: EN 388 Protective gloves against mechanical risks.
Body protection:	Wear fire/flame resistant/retardant clothing. Guideline: ISO/TR 2801:2007 Clothing for protection against heat and flame -- General recommendations for selection, care and use of protective clothing.
Other:	Wear safety shoes while handling containers Guideline: ISO 20345 Personal protective equipment - Safety footwear.
Respiratory Protection:	Not required.
Thermal hazards:	No precautionary measures are necessary.
Hygiene measures:	Specific risk management measures are not required beyond good industrial hygiene and safety procedures. Do not eat, drink or smoke when using the product.
Environmental exposure controls:	For waste disposal, see section 13.

SECTION 9: Physical And Chemical Properties

9.1 Information on basic physical and chemical properties

Appearance

Physical state:	Gas
Form:	Compressed gas
Colour:	C2H6: Colorless C3H8: Colorless C4H10: Colorless C6H14: Colorless C7H16: Colorless C8H18: Clear C9H20: Colorless C7H8: Colorless N2: Colorless CO2: Colorless

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Odour:	<p>He: Colorless CH4: Colorless C5H12: Colourless C6H6: Clear colorless C5H12: Colourless C4H10: Colorless C2H6: Odorless C3H8: Odorless C4H10: Gasoline-like or natural gas odor C6H14: Gasoline-like odor C7H16: Gasoline-like odor C8H18: Gasoline-like odor C9H20: Gasoline-like odor N2: Odorless gas CO2: Odorless He: Odorless CH4: Odorless C7H8: Mild aromatic odor C4H10: Gasoline-like or natural gas odor C5H12: Gasoline-like odor C6H6: Aromatic odor C5H12: Faint</p>
Odour Threshold:	Odour threshold is subjective and is inadequate to warn of over exposure.
pH:	not applicable.
Melting Point:	No data available.
Boiling Point:	No data available.
Sublimation Point:	not applicable.
Critical Temp. (°C):	No data available.
Flash Point:	Not applicable to gases and gas mixtures.
Evaporation Rate:	Not applicable to gases and gas mixtures.
Flammability (solid, gas):	Flammable Gas
Flammability limit - upper (%):	Not known.
Flammability limit - lower(%):	Not known.
Vapour pressure:	No reliable data available.
Vapour density (air=1):	1
Relative density:	No data available.
Solubility(ies)	
Solubility in Water:	No reliable data available.
Partition coefficient (n-octanol/water):	Not known.
Autoignition Temperature:	not applicable.
Decomposition Temperature:	Not known.
Viscosity	
Kinematic viscosity:	No data available.
Dynamic viscosity:	No data available.
Explosive properties:	Not applicable.
Oxidising Properties:	not applicable.

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9.2 Other information: None.

SECTION 10: Stability and Reactivity

- | | |
|---|--|
| 10.1 Reactivity: | No reactivity hazard other than the effects described in sub-section below. |
| 10.2 Chemical Stability: | Stable under normal conditions. |
| 10.3 Possibility of Hazardous Reactions: | Can form a potentially explosive atmosphere in air. May react violently with oxidants. |
| 10.4 Conditions to Avoid: | Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. |
| 10.5 Incompatible Materials: | Air and oxidisers. For material compatibility see latest version of 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

General information: None.

11.1 Information on toxicological effects

Acute toxicity - Oral Product Based on available data, the classification criteria are not met.

Component information

pentane	LD 50 (Rat): > 2,000 mg/kg LD 50 (Rat): >2000 mg/kg bw/day
isopentane; 2-methylbutane	LD 50 (Rat): > 2,000 mg/kg
n-hexane	LD 50 (Rat): 16 g/kg
heptane; n-heptane	LD 50 (Rat): > 5,000 mg/kg
octane; n-octane	LD 50 (Rat): > 5,000 mg/kg
Nonane	LD 50 (Rat): > 5,000 mg/kg
benzene	LD 50 (Rat): 5,970 mg/kg
toluene	LD 50 (Rat): > 5,000 mg/kg

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**Acute toxicity - Dermal
Product**

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

Component information

n-hexane	LD 50 (Rabbit): > 2,000 mg/kg
heptane; n-heptane	LD 50 (Rabbit): > 2,000 mg/kg
octane; n-octane	LD 50 (Rabbit): > 2,000 mg/kg
Nonane	LD 50 (Rabbit): > 2,000 mg/kg
toluene	LD 50 (Rabbit): > 5,000 mg/kg

**Acute toxicity - Inhalation
Product**

ATEmix (4 h): > 20000 ppm Based on available data, the classification criteria are not met.

Component information

pentane	LC 50 (Rat, 4 h): > 25.3 mg/l Remarks: Vapor LC 50 (2 h): 23500 ppm
isopentane; 2-methylbutane	LC 50 (Rat, 4 h): > 25.3 mg/l Remarks: Vapor
n-hexane	LC 50 (Rat, 4 h): 73860 ppm Remarks: Vapor
heptane; n-heptane	LC 50 (Rat, 4 h): > 29.29 mg/l Remarks: Vapor
octane; n-octane	LC 50 (Rat, 4 h): 118 mg/l
Nonane	LC 50 (Rat, 4 h): 3200 ppm
benzene	LC 50 (Rat, 4 h): 13700 ppm Remarks: Vapor
toluene	LC 50 (Rat, 4 h): 25.7 mg/l Remarks: Vapor

Repeated dose toxicity

Component information

ethane	NOAEL (Rat(Female, Male), Inhalation): 19,678 mg/m ³ Inhalation Experimental result, Key study NOAEC (Rat, Inhalation): 19678 mg/m ³
propane	LOAEL (Rat(Female, Male), Inhalation): 21,641 mg/m ³ Inhalation Experimental

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	result, Key study
Butane	NOAEL (Rat(Female, Male), Inhalation, >= 42 d): 16,000 ppm(m) Inhalation Experimental result, Key study
Isobutane	NOAEL (Rat(Female, Male), Inhalation, >= 42 d): 16,000 ppm(m) Inhalation Experimental result, Key study
pentane	NOAEL (Rat(Female, Male), Inhalation): 20,000 mg/m ³
isopentane; 2-methylbutane	NOAEL (Rat(Female, Male), Inhalation): 20,000 mg/m ³ NOAEL (Rat, Inhalation): 30 mg/l
heptane; n-heptane	LOAEL (Rat(Female, Male), Inhalation): 1,650 mg/m ³
octane; n-octane	NOAEL (Rat(Female, Male), Inhalation): 24,300 mg/m ³
Nonane	NOAEL (Rat(Female, Male), Inhalation): 24,300 mg/m ³
benzene	NOAEL (Rabbit(Male), Inhalation): < 0.26 mg/l
toluene	NOAEL (Rat(Female, Male), Oral, 13 Weeks): 625 mg/kg NOAEL (Rat(Female, Male), Inhalation): 1,131 mg/m ³
methane	NOAEL (Rat(Female, Male), Inhalation, 13 Weeks): 10,000 ppm(m) Inhalation Read-across based on grouping of substances (category approach), Key study NOAEC (Rat, Inhalation): 4000 ppm LOAEC (Rat, Inhalation): 12000 ppm

**Skin Corrosion/Irritation
Product**

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

Component information

pentane	in vivo (Rabbit): Not classified as an Irritant
isopentane; 2-methylbutane	in vivo (Rabbit): Not classified as an Irritant
heptane; n-heptane	in vivo (Rabbit): Irritating
octane; n-octane	in vivo (Rabbit): Irritating
Nonane	Irritating
benzene	in vivo (Rabbit): Irritating
toluene	in vivo (Rabbit): Irritating

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Serious Eye Damage/Eye Irritation

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

Component information

ethane	Not irritating
Butane	Not irritating
pentane	in vivo (Rabbit, 48 hrs): Not irritatingOECD GHS
isopentane; 2-methylbutane	in vivo (Rabbit, 24 hrs): Not irritatingOECD GHS
n-hexane	in vivo (Rabbit, 24 - 72 hrs): Not irritatingEU
heptane; n-heptane	in vivo (Rabbit, 24 - 72 hrs): Not irritatingGHS, EU, 2007
octane; n-octane	in vivo (Rabbit, 24 - 72 hrs): Not irritatingGHS, EU, 2007
Nonane	in vivo (Rabbit, 24 - 72 hrs): Not irritatingGHS, EU, 2007
benzene	in vivo (Rabbit): IrritatingEU
toluene	in vivo (Rabbit, 24 - 72 hrs): Not irritatingEU

Respiratory or Skin Sensitisation

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

Germ Cell Mutagenicity

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

In vitro

Component information

ethane	Ames test in vitro: (OECD Guideline 471 (Bacterial Reverse Mutation Test)): Negative.
methane	Chromosome aberration (OECD Guideline 473 (In Vitro Mammalian Chromosome Aberration Test)): Negative.

In vivo

Component information

ethane	Drosophila Sex-Linked Recessive Lethal Assay (SLRL) test: Negative.
methane	Drosophila Sex-Linked Recessive Lethal Assay (SLRL) test: Negative.

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Carcinogenicity

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

Reproductive toxicity

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

Reproductive toxicity (Fertility)

Component information

n-hexane LC50: 5,000 ppm

methane Gestation: Rat Inhalation (OECD Guideline 422 (Combined Repeated Dose Toxicity Study with the Reproduction / Developmental Toxicity Screening Test))
NOAEC: 9,000 ppm
Fertility: Rat Inhalation (OECD Guideline 422 (Combined Repeated Dose Toxicity Study with the Reproduction / Developmental Toxicity Screening Test))
NOAEC: 3,000 ppm

Developmental toxicity (Teratogenicity)

Component information

methane Rat Inhalation (OECD Guideline 422 (Combined Repeated Dose Toxicity Study with the Reproduction / Developmental Toxicity Screening Test))
NOAEC: 9,000 ppm

Specific Target Organ Toxicity - Single Exposure

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

Component information

Specific Target Organ Toxicity - Repeated Exposure

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

Aspiration Hazard

Product Not applicable to gases and gas mixtures..

SECTION 12: Ecological Information

12.1 Toxicity

Acute toxicity

Product No ecological damage caused by this product.

Acute toxicity - Fish

Component information

ethane LC 50 (Various, 96 h): 147.54 mg/l (QSAR) Remarks: QSAR QSAR, Key study
LC50 (Fish, 96 h): 91.4 mg/l

propane LC 50 (Various, 96 h): 147.54 mg/l (QSAR) Remarks: QSAR QSAR, Key study
LC50 (Fish, 96 h): 49.9 mg/l

Butane LC 50 (Various, 96 h): 147.54 mg/l (QSAR) Remarks: QSAR QSAR, Key study

Isobutane LC 50 (Various, 96 h): 147.54 mg/l (QSAR) Remarks: QSAR QSAR, Key study

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pentane	LC 50 (Oncorhynchus mykiss, 96 h): 4.26 mg/l (Static renewal) Remarks: experimental result
isopentane; 2-methylbutane	LC 50 (Oncorhynchus mykiss, 96 h): 4.26 mg/l (Static renewal) Remarks: interpreted LC 50 (Rainbow trout (Oncorhynchus mykiss), 96 h): 4.26 mg/l
n-hexane	LC 50 (Fathead minnow (Pimephales promelas), 96 h): 2.101 - 2.981 mg/l (Flow through) Remarks: Mortality
heptane; n-heptane	LC 50 (Carp (Leuciscus idus melanotus), 48 h): 270 mg/l Remarks: Mortality LL 50 (Oncorhynchus mykiss, 96 h): 5.738 mg/l (QSAR) Remarks: QSAR
octane; n-octane	LL 50 (Oncorhynchus mykiss, 96 h): 2.587 mg/l (QSAR) Remarks: QSAR
Nonane	LL 50 (Oncorhynchus mykiss, 96 h): 1.125 mg/l (QSAR) Remarks: QSAR
benzene	LC 50 (Rainbow trout, 96 h): 9.2 mg/l
toluene	LC 50 (Oncorhynchus kisutch, 96 h): 5.5 mg/l (flow-through) Remarks: experimental result
methane	LC 50 (Various, 96 h): 91.42 mg/l (QSAR) Remarks: QSAR QSAR, Key study LC 50 (Various (Freshwater), 96 h): 27.98 mg/l (calculated)

Acute toxicity - Aquatic Invertebrates

Component information

ethane	EC50 (Water flea (Daphnia magna), 48 h): 46.6 mg/l
propane	EC50 (Water flea (Daphnia magna), 48 h): 27.1 mg/l
Butane	LC50 (Water flea (Daphnia magna), 48 h): 14.2 mg/l
pentane	EC 50 (Water flea (Daphnia magna), 48 h): 2.7 mmol/m ³
isopentane; 2-methylbutane	EC 50 (Water flea (Daphnia magna)): 2.3 mg/l
n-hexane	LC 50 (Water flea (Daphnia magna), 48 h): 45 mmol/m ³
heptane; n-heptane	EC 50 (Water flea (Daphnia magna), 96 h): 71.25 - 93.75 mg/l (Static) Remarks: Intoxication
benzene	EC 50 (Water flea (Daphnia magna), 48 h): 9.23 mg/l (Static) Remarks: Intoxication
toluene	EC 50 (Water flea (Daphnia magna), 24 h): 5.23 - 9.37 mg/l (Static) Remarks: Intoxication
methane	LC 50 (Water flea (Daphnia magna), 48 h): 27.14 mg/l

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Toxicity to microorganisms

Component information

ethane	EC50 (Alga, 72 h): 16.5 mg/l
propane	EC50 (Alga, 72 h): 11.9 mg/l
methane	EC 50 (Alga, 96 h): 19.37 mg/l Not harmful to microorganisms

Toxicity to aquatic plants

Component information

Butane	LC50 (Alga, 72 h): 7.7 mg/l
pentane	EC 50 (Green algae (Selenastrum capricornutum), 72 h): 10.7 mg/l NOEC (Green algae (Selenastrum capricornutum), 72 h): 2.04 mg/l
isopentane; 2-methylbutane	NOEC (Algae (Pseudokirchneriella subcapitata), 72 h): 7.51 mg/l EC 50 (Algae (Pseudokirchneriella subcapitata), 72 h): 10.7 mg/l

12.2 Persistence and Degradability

Product

Not applicable to gases and gas mixtures..

Biodegradation

Component information

methane	100 %
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Photodegradation

Component information

pentane	Non-significant photolysis
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Stability in water

Component information

pentane	87 %Non-significant hydrolysis
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12.3 Bioaccumulative Potential

Product

The product is expected to biodegrade and is not expected to persist for long periods in an aquatic environment.

Bioconcentration Factor (BCF)

Component information

benzene	Ide, silver or golden orfe (Leuciscus idus), Bioconcentration Factor (BCF): 10 (Not reported)
toluene	Ide, silver or golden orfe (Leuciscus idus), Bioconcentration Factor (BCF): 94 (Not reported)

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12.4 Mobility in Soil
Product

Because of its high volatility, the product is unlikely to cause ground or water pollution.

Component information

pentane	Henry's Law Constant: 7,010 MPa (25 °C)
isopentane; 2-methylbutane	Henry's Law Constant: 7,851 MPa
heptane; n-heptane	Henry's Law Constant: 11,215 MPa (25 °C)
Nonane	Henry's Law Constant: 19,066 MPa (25 °C)
benzene	Henry's Law Constant: 31.18 MPa (25 °C)
toluene	Henry's Law Constant: 37.24 MPa (25 °C)
methane	Henry's Law Constant: 3,690 MPa (25 °C)

12.5 Results of PBT and vPvB
assessment
Product

Not classified as PBT or vPvB.

12.6 Other Adverse Effects:

Global Warming Potential

Global warming potential: 22.2
Contains fluorinated greenhouse gases covered by the Kyoto protocol. When discharged in large quantities may contribute to the greenhouse effect.

Component information

Carbon dioxide	<u>UN / IPCC. Greenhouse Gas Global Warming Potentials (IPCC Fourth Assessment Report, Climate Change, Table TS.2</u> - Global warming potential: 1 100-yr
methane	<u>UN / IPCC. Greenhouse Gas Global Warming Potentials (IPCC Fourth Assessment Report, Climate Change, Table TS.2</u> - Global warming potential: 25 100-yr
ethane	Global warming potential: 6
propane	Global warming potential: 3
Butane	
Isobutane	Global warming potential: 3

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IMDG

14.1 UN Number: UN 1971
14.2 UN Proper Shipping Name: NATURAL GAS, COMPRESSED
14.3 Transport Hazard Class(es)
Class: 2.1
Label(s): 2.1
EmS No.: F-D, S-U
14.3 Packing Group: -
14.5 Environmental hazards: not applicable
14.6 Special precautions for user: -

IATA

14.1 UN Number: UN 1971
14.2 Proper Shipping Name: Natural gas, compressed
14.3 Transport Hazard Class(es):
Class: 2.1
Label(s): 2.1
14.4 Packing Group: -
14.5 Environmental hazards: not applicable
14.6 Special precautions for user: -
Other information
Passenger and cargo aircraft: Forbidden.
Cargo aircraft only: Allowed.

14.7 Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code: not applicable

Additional identification:

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 that they are firmly secured. Ensure that the container valve is closed and not leaking. Container valve guards or caps should be in place. Ensure adequate air ventilation.

SECTION 15: Regulatory information

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

EU Regulations

Regulation (EC) No. 1907/2006 Annex XVII Substances subject to restriction on marketing and use:

Chemical name	CAS-No.	Concentration
propane	74-98-6	0.1 - 1.0%
pentane	109-66-0	- <0.1%
isopentane; 2-methylbutane	78-78-4	- <0.1%
n-hexane	110-54-3	- <0.1%

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heptane; n-heptane	142-82-5	- <0.1%
octane; n-octane	111-65-9	- <0.1%
benzene	71-43-2	- <0.1%
toluene	108-88-3	- <0.1%
methane	74-82-8	90 - 100%

Directive 2004/37/EC on the protection of workers from the risks related to exposure to carcinogens and mutagens at work.:

Chemical name	CAS-No.	Concentration
pentane	109-66-0	0 - <0.1%
isopentane; 2-methylbutane	78-78-4	0 - <0.1%
benzene	71-43-2	0 - <0.1%

Directive 92/85/EEC: on the safety and health of pregnant workers and workers who have recently given birth or are breast feeding.:

Chemical name	CAS-No.	Concentration
pentane	109-66-0	0 - <0.1%
isopentane; 2-methylbutane	78-78-4	0 - <0.1%
benzene	71-43-2	0 - <0.1%
toluene	108-88-3	0 - <0.1%

Directive 96/61/EC: concerning integrated pollution prevention and control (IPPC): Article 15, European Pollution Emission Registry (EPER):

Chemical name	CAS-No.	Concentration
Carbon dioxide	124-38-9	0.1 - 1.0%
benzene	71-43-2	0 - <0.1%

Directive 96/82/EC (Seveso II): on the control of major accident hazards involving dangerous substances:

Chemical name	CAS-No.	Concentration
methane	74-82-8	90 - 100%
ethane	74-84-0	1.0 - 10%

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propane	74-98-6	0.1 - 1.0%
Butane	106-97-8	0.1 - 1.0%
Isobutane	75-28-5	0.1 - 1.0%
pentane	109-66-0	0 - <0.1%
isopentane; 2-methylbutane	78-78-4	0 - <0.1%
n-hexane	110-54-3	0 - <0.1%
heptane; n-heptane	142-82-5	0 - <0.1%
octane; n-octane	111-65-9	0 - <0.1%
benzene	71-43-2	0 - <0.1%
toluene	108-88-3	0 - <0.1%

Directive 98/24/EC on the protection of workers from the risks related to chemical agents at work:

Chemical name	CAS-No.	Concentration
Butane	106-97-8	0.1 - 1.0%
pentane	109-66-0	0 - <0.1%
isopentane; 2-methylbutane	78-78-4	0 - <0.1%
n-hexane	110-54-3	0 - <0.1%
heptane; n-heptane	142-82-5	0 - <0.1%
octane; n-octane	111-65-9	0 - <0.1%
benzene	71-43-2	0 - <0.1%
toluene	108-88-3	0 - <0.1%

National Regulations

Dangerous Substances and Explosive Atmospheres Regulations (DSEAR 2002 No. 2776). Management of Health and Safety at Work Regulations (1999 No. 3242). The Regulatory Reform (Fire Safety) Order 2005 (2005 No. 1541). Control of Substances Hazardous to Health Regulations (COSHH, 2002 No. 2677). Provision and Use of Work Equipment Regulations (PUWER, 1998 No. 2306). Personal Protective Equipment Regulations (1992 No. 2966). Control of Major Accident Hazards Regulations (COMAH, 2015 No. 483). Equipment and Protective Systems Intended for Use in Potentially Explosive Atmospheres Regulations (EPS, 1996 No. 192). Pressure Systems Safety Regulations (PSSR, 2000 No. 128). Only products that comply with the food

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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) 453/2010.

15.2 Chemical safety assessment: No Chemical Safety Assessment has been carried out.

SECTION 16: Other Information

Revision Information: Not relevant.

Key literature references and sources for data:

Various sources of data have been used in the compilation of this SDS, they include but are not exclusive to:
Agency for Toxic Substances and Diseases Registry (ATSDR) (<http://www.atsdr.cdc.gov/>).
European Chemical Agency: Guidance on the Compilation of Safety Data Sheets.
European Chemical Agency: Information on Registered Substances
<http://apps.echa.europa.eu/registered/registered-sub.aspx#search>
European Industrial Gases Association (EIGA) Doc. 169 Classification and Labelling guide.
International Programme on Chemical Safety (<http://www.inchem.org/>)
ISO 10156:2010 Gases and gas mixtures - Determination of fire potential and oxidizing ability for the selection of cylinder valve outlets.
Matheson Gas Data Book, 7th Edition.
National Institute for Standards and Technology (NIST) Standard Reference Database Number 69.
The ESIS (European chemical Substances Information System) platform of the former European Chemicals Bureau (ECB) ESIS (<http://ecb.jrc.ec.europa.eu/esis/>).
The European Chemical Industry Council (CEFIC) ERICards.
United States of America's National Library of Medicine's toxicology data network TOXNET (<http://toxnet.nlm.nih.gov/index.html>)
Threshold Limit Values (TLV) from the American Conference of Governmental Industrial Hygienists (ACGIH).
Substance specific information from suppliers.
Details given in this document are believed to be correct at the time of publication.
EH40 (as amended) Workplace exposure limits.

Wording of the R-phrases and H-statements in sections 2 and 3

H220	Extremely flammable gas.
H280	Contains gas under pressure; may explode if heated.
R12	Extremely flammable.

Training information: Users of breathing apparatus must be trained. Ensure operators understand the flammability hazard.

Classification according to Regulation (EC) No 1272/2008 as amended.

Flam. Gas 1, H220
Press. Gas Compr. Gas, H280

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Other information:

Before using this product in any new process or experiment, a thorough material compatibility and safety study should be carried out. Ensure adequate air ventilation. Ensure all national/local regulations are observed. Ensure equipment is adequately earthed. 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. Note: When the Product Name appears in the SDS header the decimal sign and its position comply with rules for the structure and drafting of international standards, and is a comma on the line. As an example 2,000 is two (to three decimal places) and not two thousand, whilst 1.000 is one thousand and not one (to three decimal places).

Last revised date:

11.07.2016

Disclaimer:

This information is provided without warranty. The information is believed to be correct. This information should be used to make an independent determination of the methods to safeguard workers and the environment.