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

1.1 Product identifier

Product name: LNG, Liquefied natural gas

Trade name: LNG, Liquefied natural gas

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

Identified uses: Industrial and professional. Perform risk assessment prior to use.
Uses advised against Consumer use.

1.3 Details of the supplier of the safety data sheet

Supplier

AGA AS
Postboks 13 Nydalen
N-0409 Oslo Norway

Telephone: +4723177200

E-mail: kundeservice@no.aga.com

1.4 Emergency telephone number: +47 22 59 13 00 (24h - Giftinformasjonssentralen)

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

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

Physical Hazards

Flammable gas	Category 1	H220: Extremely flammable gas.
Gases under pressure	Liquefied gas	H280: Contains gas under pressure; may explode if heated.

Health Hazards

Toxic to reproduction	Category 1A	H360D: May damage the unborn child.
Specific Target Organ Toxicity - Repeated Exposure	Category 2	H373: May cause damage to organs through prolonged or repeated exposure.

2.2 Label Elements

Contains: Carbon monoxide

Signal Words: Danger

Hazard Statement(s): H220: Extremely flammable gas.
H280: Contains gas under pressure; may explode if heated.
H360D: May damage the unborn child.
H373: May cause damage to organs through prolonged or repeated exposure.

Precautionary Statements

Prevention: P202: Do not handle until all safety precautions have been read and understood.
P210: Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
P260: Do not breathe gas/vapors.

Response: P308+P313: IF exposed or concerned: Get medical advice/attention.
P377: Leaking gas fire: Do not extinguish, unless leak can be stopped safely.

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

Disposal: None.

Supplemental label information
Restricted to professional users.

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
Butane	C4H10	1,0100%	106-97-8	203-448-7	01-2119474691-32	#
Pentane	C5H12	4.200PPM	109-66-0	203-692-4	01-2119459286-30	#
Carbon monoxide	CO	1,5700%	630-08-0	211-128-3	01-2119480165-39	#
Methane	CH4	88,37%	74-82-8	200-812-7	01-2119474442-39	
Ethane	C2H6	5,7100%	74-84-0	200-814-8	01-2119486765-21	
Propane	C3H8	2,0600%	74-98-6	200-827-9	01-2119486944-21	#
Nitrogen	N2	3.100PPM	7727-37-9	231-783-9	Listed in Annex IV/V of Regulation (EC) No 1907/2006 (REACH), exempted from registration.	
Hydrogen sulphide	H2S	5.500PPM	7783-06-4	231-977-3	01-2119445737-29	#

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

Classification

Chemical name	Classification		Notes
Butane	CLP:	Flam. Gas 1;H220, Press. Gas Liquef. Gas;H280	
Pentane	CLP:	Asp. Tox. 1;H304, STOT SE 3;H336, Aquatic Chronic 2;H411, Flam. Liq. 1;H224	Note C
Carbon monoxide	CLP:	Repr. 1A;H360D, Acute Tox. 3;H331, Flam. Gas 1;H220, Press. Gas Compr. Gas;H280, STOT RE 1;H372	
Methane	CLP:	Flam. Gas 1;H220, Press. Gas Compr. Gas;H280	Note U
Ethane	CLP:	Flam. Gas 1;H220, Press. Gas Liquef. Gas;H280	
Propane	CLP:	Press. Gas Liquef. Gas;H280, Flam. Gas 1;H220	
Nitrogen	CLP:	Press. Gas Compr. Gas;H280	
Hydrogen sulphide	CLP:	Aquatic Acute 1;H400, Press. Gas Liquef. Gas;H280, Acute Tox. 2;H330, Flam. Gas 1;H220, STOT SE 3;H335	

Note 4, Note 6: Preparations containing these substances shall be classified as harmful with R65 if they meet the criteria set out in section 19, subsection 3.2, of the Regulations relating to criteria for the classification of dangerous chemicals., Preparations containing these substances have to be assigned R67 if they meet the criteria in section 3.2.8 in Annex VI. [This note will no longer apply from the date on which the criteria for the use of R67 provided for in Directive 1999/45/EC enter into force.]
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 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 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.

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. Danger of serious damage to health by prolonged exposure. Causes damage to organs.

4.3 Indication of any immediate medical attention and special treatment needed

Hazards:	Danger of serious damage to health by prolonged exposure. Causes damage to organs.
Treatment:	Get immediate medical advice/attention.

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. Use water spray to reduce vapors or divert vapor cloud drift.
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 reignition 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. Use of water may result in the formation of very toxic aqueous solutions. Keep run-off water out of sewers and water sources. Dike for water control.
Special protective equipment for fire-fighters:	Gas tight chemically protective clothing (Type 1) in combination with self contained breathing apparatus. Guideline: EN 943-2 Protective clothing against liquid and gaseous chemicals, aerosols and solid particles. Performance requirements for gas-tight (Type 1) chemical protective suits for emergency teams (ET)

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 . In case of leakage, eliminate all ignition sources. 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. Reduce vapour with fog or fine water spray. Keep run-off water out of sewers and water sources. Dike for water control.
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.

SECTION 7: Handling and storage:

7.1 Precautions for safe handling: Only experienced and properly instructed persons should handle gases under pressure. Avoid exposure - obtain special instructions before use. Use only properly specified equipment which is suitable for this product, its supply pressure and temperature. Installation of a cross purge assembly between the container and the regulator is recommended. Excess pressure must be vented through an appropriate scrubber system. 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 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. 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 contaminates 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. Always remove grease with soap and water or skin cleaning agent, never use organic solvents.

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. Keep away from food, drink and animal feeding stuffs.

7.3 Specific end use(s): None.

SECTION 8: Exposure controls/personal protection

8.1 Control Parameters

Occupational Exposure Limits

Chemical name	Type	Exposure Limit Values	Source
Propane	NORMEN	500 ppm 900 mg/m3	Norway. Regulation No. 1358 on Measures and Limit Values for Physical and Chemical Factors in Work Environment and Infection Groups for Biological Factors (12 2011)
Carbon monoxide	CEIL	100 ppm	Norway. Regulation No. 1358 on Measures and Limit Values for Physical and Chemical Factors in Work Environment and Infection Groups for Biological Factors (12 2011)
	NORMEN	25 ppm 29 mg/m3	Norway. Regulation No. 1358 on Measures and Limit Values for Physical and Chemical Factors in Work Environment and Infection Groups for Biological Factors (12 2011)
Butane	NORMEN	250 ppm 600 mg/m3	Norway. Regulation No. 1358 on Measures and Limit Values for Physical and Chemical Factors in Work Environment and Infection Groups for Biological Factors (12 2011)
Hydrogen sulphide	CEIL	10 ppm 14 mg/m3	Norway. Regulation No. 1358 on Measures and Limit Values for Physical and Chemical Factors in Work Environment and Infection Groups for Biological Factors (12 2014)
	NORMEN	5 ppm 7 mg/m3	Norway. Regulation No. 1358 on Measures and Limit Values for Physical and Chemical Factors in Work Environment and Infection Groups for Biological Factors (12 2014)
	TWA	5 ppm 7 mg/m3	EU. Indicative Exposure Limit Values in Directives 91/322/EEC, 2000/39/EC, 2006/15/EC, 2009/161/EU (12 2009)
	STEL	10 ppm 14 mg/m3	EU. Indicative Exposure Limit Values in Directives 91/322/EEC, 2000/39/EC, 2006/15/EC, 2009/161/EU (12 2009)
Pentane	NORMEN	250 ppm 750 mg/m3	Norway. Regulation No. 1358 on Measures and Limit Values for Physical and Chemical Factors in Work Environment and Infection Groups for Biological Factors (12 2014)
	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)

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	-
Carbon monoxide	Worker - inhalative, long-term - systemic	23 mg/m3	-
	Worker - inhalative, short-term - systemic	117 mg/m3	-
	Worker - inhalative, long-term - local	23 mg/m3	-
	Worker - inhalative, short-term - local	117 mg/m3	-
Hydrogen sulphide	Workers - Inhalation, Local, long-term	7 mg/m3	respiratory tract irritation
	Workers - Inhalation, Systemic, short-term	14 mg/m3	-
	Workers - Inhalation, Systemic, long-term	7 mg/m3	Repeated dose toxicity
	Workers - Inhalation, Local, short-term	14 mg/m3	-

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	-
Carbon monoxide			PNEC not available.
Hydrogen sulphide	Aquatic (freshwater)	0,05 µg/l	-
	Aquatic (intermit. releases)	0,5 µg/l	-
	Aquatic (marine water)	14,9 µg/l	-
	Sewage treatment plant	1,33 mg/l	-

8.2 Exposure controls

Appropriate engineering controls:

Consider a work permit system e.g. for maintenance activities. Provide adequate general and local exhaust ventilation. Keep concentrations well below lower explosion limits. Keep concentrations well below occupational exposure limits. Gas detectors should be used when quantities of flammable gases or vapours may be released. Gas detectors should be used when toxic quantities may be released. Systems under pressure should be regularly checked for leakages. Product to be handled in a closed system and under strictly controlled conditions. Only use permanent leak tight installations (e.g. welded pipes). Take precautionary measures against static discharges.

Individual protection measures, such as personal protective equipment

General information:	Keep suitable chemically resistant protective clothing readily available for emergency use. Protect eyes, face and skin from contact with product. 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. Chemically resistant gloves complying with EN 374 should be worn at all times when handling chemical products if a risk assessment indicates this is necessary. Guideline: EN 374-1/2/3 Protective gloves against chemicals and micro-organisms.
Body protection:	Wear fire resistant or flame 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:	Reference should be made to European Standard EN 689 for methods for the assessment of exposure by inhalation to chemical agents and national guidance documents for methods for the determination of hazardous substances. 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.
Thermal hazards:	No precautionary measures are necessary.
Hygiene measures:	Obtain special instructions before use. Do not eat, drink or smoke when using the product.
Environmental exposure controls:	For waste disposal, see section 13 of the SDS.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

Appearance

Physical state:	Gas
Form:	Liquefied gas

Color:	C4H10: Colorless C5H12: Colorless CO: Colorless CH4: Colorless C2H6: Colorless C3H8: Colorless N2: Colorless H2S: Colorless
Odor:	C4H10: Gasoline-like or natural gas odor C5H12: Gasoline-like odor CO: Odorless CH4: Odorless C2H6: Odorless C3H8: Odorless N2: Odorless gas H2S: Strong odor of rotten eggs
Odor Threshold:	Odor 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 (%):	15 %(V)
Flammability Limit - Lower (%):	4,4 %(V)
Vapor pressure:	No reliable data available.
Vapor density (air=1):	0,65 (calculated) (15 °C)
Relative density:	No data available.
Solubility(ies)	
Solubility in Water:	No 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.
Oxidizing properties:	not applicable.

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. Avoid moisture in the installation.

10.5 Incompatible Materials: Air and oxidizers. 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: Carbon monoxide: Has been shown to produce adverse effects to the cardiovascular, central nervous, and reproductive systems in laboratory animals and chronically exposed humans.

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 Remarks: Experimental result, Key study

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

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 Read-across based on grouping of substances (category approach), Key study
Carbon monoxide	LC 50 (Rat, 4 h): 1300 ppm LC 50 (Rat, 1 h): 3760 ppm
Ethane	LC 50 (Rat, 10 min): > 800000 ppm Remarks: Inhalation Experimental result, Key study
Hydrogen sulphide	LC 50 (Rat, 4 h): 356 ppm

Repeated dose toxicity

Component Information

Butane	NOAEL (Rat(Female, Male), Inhalation, >= 42 d): 16.000 ppm(m) Inhalation Experimental result, Key study
Pentane	NOAEL (Rat, Inhalation): 30 mg/l Inhalation Read-across based on grouping of substances (category approach), Key study
Carbon monoxide	LOAEL (Rat(Female), Inhalation, 72 Weeks): 200 ppm(m) Inhalation Experimental result, Key study LOAEC (Rat, Inhalation): 200 ppm (Target Organ(s): Respiratory system)
Methane	NOAEL (Rat(Female, Male), Inhalation, 13 Weeks): 10.000 ppm(m) Inhalation Read-across based on grouping of substances (category approach), Key study
Ethane	NOAEL (Rat(Female, Male), Inhalation, >= 28 d): 4.000 ppm(m) Inhalation Experimental result, Key study NOAEC (Rat, Inhalation): 19678 mg/m³
Propane	LOAEL (Rat(Female, Male), Inhalation): 21.641 mg/m3 Inhalation Experimental result, Key study
Hydrogen sulphide	LOAEL (Rat(Female, Male), Inhalation, 90 d): 30,5 ppm(m) Inhalation Experimental result, Key study

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 Experimental result, Key study
Carbon monoxide	Not classified as an irritant.

Serious Eye Damage/Eye Irritation

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

Component Information

Pentane	in vivo (Rabbit, 48 hrs): Not irritatingOECD GHS
Carbon monoxide	Not classified as an irritant.
Ethane	Not irritating

Respiratory or Skin Sensitization

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

Component Information

Carbon monoxide	No known effects from this product.

Germ Cell Mutagenicity

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

Component Information

Carbon monoxide: There is no evidence of mutagenic potential.

In vitro

Component Information

Methane: Chromosome aberration (OECD Guideline 473 (In Vitro Mammalian Chromosome Aberration Test)): Negative.

Ethane: Ames test in vitro: (OECD Guideline 471 (Bacterial Reverse Mutation Test)): Negative.

In vivo

Component Information

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

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

Carcinogenicity

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

Component Information

Carbon monoxide: No evidence of carcinogenic effects.

Reproductive toxicity

Product May damage fertility or the unborn child.

Component Information

Carbon monoxide: May damage fertility or the unborn child.

Reproductive toxicity (Fertility)

Component Information

Carbon monoxide: NOAEC (embryotoxicity): 65 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

Carbon monoxide	LOAEC: 125 ppm
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

Carbon monoxide	Route of Exposure: Inhalation Target Organ(s): Blood Causes damage to red blood cells (haemolytic poison). Carbon monoxide binds reversibly to haemoglobin (Hb) to form carboxyhaemoglobin (CoHb), reducing the capacity of the blood to transport oxygen.

Specific Target Organ Toxicity - Repeated Exposure

Product May cause damage to organs through prolonged or repeated exposure.

Component Information

Carbon monoxide	Route of Exposure: Inhalation Target Organ(s): Heart Risk of serious health injuries in case of long term exposure.

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

Butane	LC 50 (Various, 96 h): 147,54 mg/l (QSAR) Remarks: QSAR QSAR, Key study
Pentane	LC 50 (Oncorhynchus mykiss, 96 h): 4,26 mg/l (Static renewal) Remarks: Experimental result, Supporting study
Carbon monoxide	LC 50 (Fish (no species mentioned)): 672,6 mg/l Remarks: QSAR QSAR, Supporting study
Methane	LC 50 (Various, 96 h): 27,98 mg/l (QSAR) Remarks: QSAR QSAR, Key study
Ethane	LC 50 (Various, 96 h): 147,54 mg/l (QSAR) Remarks: QSAR QSAR, Key study

Propane	LC 50 (Various, 96 h): 147,54 mg/l (QSAR) Remarks: QSAR QSAR, Key study
Hydrogen sulphide	LC 50 (Oncorhynchus mykiss, 96 h): 0,01275 mg/l (flow-through) Remarks: Experimental result, Weight of Evidence study

Acute toxicity - Aquatic Invertebrates

Component Information

Butane	LC 50 (Daphnid, 48 h): 14,22 mg/l (QSAR) Remarks: QSAR QSAR, Key study
Pentane	EC 50 (Daphnia magna, 48 h): 9,1 mg/l (Static) Remarks: Experimental result, Supporting study EC 50 (Water flea (Daphnia magna), 48 h): 2.7 mmol/m³
Carbon monoxide	LC 50 (48 h): 307,5 mg/l Remarks: QSAR QSAR, Supporting study
Methane	LC 50 (Daphnid, 48 h): 27,14 mg/l (QSAR) Remarks: QSAR QSAR, Key study
Ethane	LC 50 (Daphnid, 48 h): 16,33 mg/l (QSAR) Remarks: QSAR QSAR, Key study
Propane	LC 50 (Daphnia sp., 48 h): 69,43 mg/l Remarks: QSAR QSAR, Key study
Hydrogen sulphide	EC 50 (Daphnia sp., 48 h): 0,12 mg/l (Static) Remarks: Experimental result, Key study

Toxicity to microorganisms

Component Information

Methane	EC 50 (Alga, 96 h): 19,37 mg/l Not harmful to microorganisms
Ethane	EC50 (Alga, 72 h): 16,5 mg/l
Propane	EC50 (Alga, 72 h): 11,9 mg/l

Chronic Toxicity - Aquatic Invertebrates

Component Information

Pentane	NOAEL (Daphnia magna, 21 d): 10,76 mg/l (QSAR) QSAR QSAR, Key study

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

12.2 Persistence and Degradability

Product

Not applicable to gases and gas mixtures..

Component Information

Carbon monoxide	Will not undergo hydrolysis.

Biodegradation

Component Information

Carbon monoxide	Not readily biodegradable. Inorganic compound.
Methane	100 %
Hydrogen sulphide	76 % (2 d) Detected in water. Not specified

Photodegradation

Component Information

Pentane	Non-significant photolysis

Stability in water

Component Information

Pentane	87 %Non-significant hydrolysis

12.3 Bioaccumulative potential

Product

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

Component Information

Carbon monoxide	Because of the low log Kow, accumulation in organisms is not expected.

Bioconcentration Factor (BCF)

Component Information

Pentane	Pimephales promelas, Bioconcentration Factor (BCF): 171 Aquatic sediment QSAR, Key study

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

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: 20,2
Contains greenhouse gas(es). When discharged in large quantities may contribute to the greenhouse effect.

Component Information

Butane	EU. F-Gases Subject to Emission Limits/Reporting (Annexes I, II), Regulation 517/2014/EU on FGGs - Global warming potential: 4 100-yr
Pentane	EU. F-Gases Subject to Emission Limits/Reporting (Annexes I, II), Regulation 517/2014/EU on FGGs - Global warming potential: 5 100-yr
Methane	EU. F-Gases Subject to Emission Limits/Reporting (Annexes I, II), Regulation 517/2014/EU on FGGs - Global warming potential: 25 100-yr
Ethane	EU. F-Gases Subject to Emission Limits/Reporting (Annexes I, II), Regulation 517/2014/EU on FGGs - Global warming potential: 6 100-yr
Propane	EU. F-Gases Subject to Emission Limits/Reporting (Annexes I, II), Regulation 517/2014/EU on FGGs - Global warming potential: 3 100-yr

SECTION 13: Disposal considerations

13.1 Waste treatment methods

General information:	Avoid discharges to atmosphere. Do not discharge into any place where its accumulation could be dangerous. Consult supplier for specific recommendations. 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.
Disposal methods:	Refer to the EIGA code of practice (Doc.30 "Disposal of Gases", downloadable at http://www.eiga.org) for more guidance on suitable disposal methods. Dispose of container via supplier only. Discharge, treatment, or disposal may be subject to national, state, or local laws.

European Waste Codes

Container: 16 05 04*: Gases in pressure containers (including halons) containing dangerous substances.

SECTION 14: Transport information

ADR

14.1 UN Number:	UN 1972
14.2 UN Proper Shipping Name:	NATURAL GAS, REFRIGERATED LIQUID(Methane, Hydrogen sulfide)
14.3 Transport Hazard Class(es)	
Class:	2
Label(s):	2.1
Hazard No. (ADR):	223
Tunnel restriction code:	(B/D)
14.4 Packing Group:	–
14.5 Environmental hazards:	not applicable
14.6 Special precautions for user:	–

RID

14.1 UN Number:	UN 1972
14.2 UN Proper Shipping Name	NATURAL GAS, REFRIGERATED LIQUID(Methane, Hydrogen sulfide)
14.3 Transport Hazard Class(es)	
Class:	2
Label(s):	2.1
14.4 Packing Group:	–
14.5 Environmental hazards:	not applicable
14.6 Special precautions for user:	–

IMDG

14.1 UN Number:	UN 1972
14.2 UN Proper Shipping Name:	NATURAL GAS, REFRIGERATED LIQUID(Methane, Hydrogen sulfide)
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 1972
14.2 Proper Shipping Name:	Natural gas, refrigerated liquid(Methane, Hydrogen sulfide)
14.3 Transport Hazard Class(es):	
Class:	2.1
Label(s):	–
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:	Forbidden.

14.7 Transport in bulk according to Annex II of MARPOL 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
Pentane	109-66-0	0,1 - 1,0%
Carbon monoxide	630-08-0	1,0 - 10%
Methane	74-82-8	80 - 90%
Propane	74-98-6	1,0 - 10%
Hydrogen sulphide	7783-06-4	0,1 - 1,0%

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
Carbon monoxide	630-08-0	1,0 - 10%
Pentane	109-66-0	0,1 - 1,0%

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

Chemical name	CAS-No.	Concentration
Carbon monoxide	630-08-0	1,0 - 10%

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

Chemical name	CAS-No.	Concentration
Methane	74-82-8	80 - 90%
Butane	106-97-8	1,0 - 10%
Carbon monoxide	630-08-0	1,0 - 10%
Ethane	74-84-0	1,0 - 10%
Propane	74-98-6	1,0 - 10%
Pentane	109-66-0	0,1 - 1,0%
Hydrogen sulphide	7783-06-4	0,1 - 1,0%

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	1,0 - 10%
Carbon monoxide	630-08-0	1,0 - 10%
Pentane	109-66-0	0,1 - 1,0%
Hydrogen sulphide	7783-06-4	0,1 - 1,0%

National Regulations

Council Directive 89/391/EEC on the introduction of measures to encourage improvements in the safety and health of workers at work Directive 89/686/EEC on personal protective equipment Directive 94/9/EC 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: 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 5 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.

Wording of the H-statements in section 2 and 3

H220	Extremely flammable gas.
H224	Extremely flammable liquid and vapor.
H280	Contains gas under pressure; may explode if heated.
H304	May be fatal if swallowed and enters airways.
H330	Fatal if inhaled.
H331	Toxic if inhaled.
H335	May cause respiratory irritation.
H336	May cause drowsiness or dizziness.
H360D	May damage the unborn child.
H372	Causes damage to organs through prolonged or repeated exposure.
H373	May cause damage to organs through prolonged or repeated exposure.
H400	Very toxic to aquatic life.
H411	Toxic to aquatic life with long lasting effects.

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

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

Flam. Gas 1, H220
Press. Gas Liq. Gas, H280
Repr. 1A, H360D
STOT RE 2, H373

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.

Last revised date: 10.11.2017

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.