Opteon™ XL41 (R-454B) Refrigerant

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

1.1 Product identifier

Trade name : Opteon™ XL41 (R-454B) Refrigerant

SDS-Identcode : 130000143545

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

Use of the Sub-stance/Mixture : Refrigerant

Recommended restrictions on use : For professional and industrial installation and use only.

1.3 Details of the supplier of the safety data sheet

Company : Chemours Netherlands B.V.
Baanhoekweg 22
3313 LA Dordrecht Netherlands

Telephone : +31-(0)-78-630-1011

Telefax : +31-78-6163737

E-mail address of person responsible for the SDS : sds-support@chemours.com

1.4 Emergency telephone number

+(44)-870-8200418 (CHEMTREC - Recommended)

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

Classification (REGULATION (EC) No 1272/2008)

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

2.2 Label elements

Labelling (REGULATION (EC) No 1272/2008)

Hazard pictograms :

Signal word : Danger

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

Precautionary statements :

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:

P410 + P403 Protect from sunlight. Store in a well-ventilated place.

Additional Labelling

Contains fluorinated greenhouse gases. (HFC-32)

2.3 Other hazards

This mixture contains no substance considered to be persistent, bioaccumulating and toxic (PBT).
This mixture contains no substance considered to be very persistent and very bioaccumulating (vPvB).
Vapours are heavier than air and can cause suffocation by reducing oxygen available for breathing.
Misuse or intentional inhalation abuse may cause death without warning symptoms, due to cardiac effects.
Rapid evaporation of the product may cause frostbite.
May displace oxygen and cause rapid suffocation.

SECTION 3: Composition/information on ingredients

3.2 Mixtures

Components

Chemical name	CAS-No. EC-No. Index-No. Registration number	Classification	Concentration (% w/w)
Difluoromethane*	75-10-5 200-839-4 01-2119471312-47	Flam. Gas 1; H220 Press. Gas Liquefied gas; H280	68.9
2,3,3,3-Tetrafluoropropene*	754-12-1 468-710-7 01-0000019665-61	Flam. Gas 1; H220 Press. Gas Liquefied gas; H280	31.1

* Voluntarily-disclosed non-hazardous substance
For explanation of abbreviations see section 16.

SECTION 4: First aid measures

4.1 Description of first aid measures

General advice : In the case of accident or if you feel unwell, seek medical advice immediately.
When symptoms persist or in all cases of doubt seek medical advice.

Protection of first-aiders : No special precautions are necessary for first aid responders.

If inhaled : If inhaled, remove to fresh air.
Get medical attention if symptoms occur.

In case of skin contact : Thaw frosted parts with lukewarm water. Do not rub affected area.
Get medical attention immediately.

In case of eye contact : Get medical attention immediately.

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

4.2 Most important symptoms and effects, both acute and delayed

Symptoms : May cause cardiac arrhythmia.

Other symptoms potentially related to misuse or inhalation abuse are
Cardiac sensitisation
Anaesthetic effects
Light-headedness
Dizziness
confusion
Lack of coordination
Drowsiness
Unconsciousness

Risks : Contact with liquid or refrigerated gas can cause cold burns and frostbite.

4.3 Indication of any immediate medical attention and special treatment needed

Treatment : Treat symptomatically and supportively.

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media : Water spray
Alcohol-resistant foam
Carbon dioxide (CO2)
Dry chemical

Unsuitable extinguishing : None known.

media

5.2 Special hazards arising from the substance or mixture

Specific hazards during fire-fighting	:	Vapours may form flammable mixture with air Exposure to combustion products may be a hazard to health. If the temperature rises there is danger of the vessels bursting due to the high vapor pressure.
Hazardous combustion products	:	Hydrogen fluoride carbonyl fluoride Carbon oxides Fluorine compounds

5.3 Advice for firefighters

Special protective equipment for firefighters	:	Wear self-contained breathing apparatus for firefighting if necessary. Use personal protective equipment.
Specific extinguishing methods	:	Use extinguishing measures that are appropriate to local circumstances and the surrounding environment. Fight fire remotely due to the risk of explosion. Use water spray to cool unopened containers. Leaking gas fire: Do not extinguish, unless leak can be stopped safely. Remove undamaged containers from fire area if it is safe to do so. Evacuate area.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

Personal precautions	:	Evacuate personnel to safe areas. Only trained personnel should re-enter the area. Remove all sources of ignition. Avoid skin contact with leaking liquid (danger of frostbite). Ventilate the area. Follow safe handling advice and personal protective equipment recommendations.

6.2 Environmental precautions

Environmental precautions	:	Prevent further leakage or spillage if safe to do so. Retain and dispose of contaminated wash water.

6.3 Methods and material for containment and cleaning up

Methods for cleaning up	:	Ventilate the area. Non-sparking tools should be used. Suppress (knock down) gases/vapours/mists with a water spray jet. Local or national regulations may apply to releases and disposal of this material, as well as those materials and items

employed in the cleanup of releases. You will need to determine which regulations are applicable.
Sections 13 and 15 of this SDS provide information regarding certain local or national requirements.

6.4 Reference to other sections

See sections: 7, 8, 11, 12 and 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling

Technical measures	:	Use equipment rated for cylinder pressure. Use a backflow preventative device in piping. Close valve after each use and when empty.
Local/Total ventilation	:	Use with local exhaust ventilation. Use only in an area equipped with explosion-proof exhaust ventilation if advised by assessment of the local exposure potential
Advice on safe handling	:	Handle in accordance with good industrial hygiene and safety practice, based on the results of the workplace exposure assessment Keep container tightly closed. Wear cold insulating gloves/ face shield/ eye protection. Prevent backflow into the gas tank. Open the valves slowly to prevent pressure surges. Close valve after each use and when empty. Do NOT change or force fit connections. Prevent the intrusion of water into the gas tank. Keep away from heat and sources of ignition. Take precautionary measures against static discharges. Take care to prevent spills, waste and minimize release to the environment. Avoid breathing gas. Valve protection caps and valve outlet threaded plugs must remain in place unless container is secured with valve outlet piped to use point. Use a check valve or trap in the discharge line to prevent hazardous back flow into the cylinder. Use a pressure reducing regulator when connecting cylinder to lower pressure (<3000 psig) piping or systems. Never attempt to lift cylinder by its cap. Do not drag, slide or roll cylinders. Use a suitable hand truck for cylinder movement.
Hygiene measures	:	Ensure that eye flushing systems and safety showers are located close to the working place. When using do not eat, drink or smoke. Wash contaminated clothing before re-use.

7.2 Conditions for safe storage, including any incompatibilities

Requirements for storage areas and containers : Cylinders should be stored upright and firmly secured to prevent falling or being knocked over. Separate full containers from empty containers. Do not store near combustible materials. Avoid area where salt or other corrosive materials are present. Keep in properly labelled containers. Keep tightly closed. Keep in a cool, well-ventilated place. Keep away from direct sunlight. Store in accordance with the particular national regulations. Keep away from heat and sources of ignition.

Advice on common storage : Do not store with the following product types:
Self-reactive substances and mixtures
Organic peroxides
Oxidizing agents
Flammable liquids
Flammable solids
Pyrophoric liquids
Pyrophoric solids
Self-heating substances and mixtures
Substances and mixtures, which in contact with water, emit flammable gases
Explosives
Acutely toxic substances and mixtures
Substances and mixtures with chronic toxicity

Storage period : > 10 yr

Recommended storage temperature : < 52 °C

Further information on storage stability : The product has an indefinite shelf life when stored properly.

7.3 Specific end use(s)

Specific use(s) : No data available

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Derived No Effect Level (DNEL) according to Regulation (EC) No. 1907/2006:

Substance name	End Use	Exposure routes	Potential health effects	Value
Difluoromethane	Workers	Inhalation	Long-term systemic effects	7035 mg/m3
	Consumers	Inhalation	Long-term systemic effects	750 mg/m3
2,3,3,3-Tetrafluoropropene	Workers	Inhalation	Long-term systemic effects	950 mg/m3

Predicted No Effect Concentration (PNEC) according to Regulation (EC) No. 1907/2006:

Substance name	Environmental Compartment	Value
Difluoromethane	Fresh water	0.142 mg/l
	Intermittent use/release	1.42 mg/l
	Fresh water sediment	0.534 mg/kg
2,3,3,3-Tetrafluoropropene	Fresh water	0.1 mg/l
	Intermittent use/release	1 mg/l
	Fresh water sediment	1.77 mg/kg dry weight (d.w.)
	Soil	1.54 mg/kg dry weight (d.w.)
	Marine water	0.01 mg/l
	Marine sediment	0.178 mg/kg dry weight (d.w.)

8.2 Exposure controls

Engineering measures

Minimize workplace exposure concentrations.
Use only in an area equipped with explosion-proof exhaust ventilation if advised by assessment of the local exposure potential
Use with local exhaust ventilation.

Personal protective equipment

Eye protection : Wear the following personal protective equipment:
Chemical resistant goggles must be worn.
Face-shield

Hand protection
Material : Low temperature resistant gloves

Remarks : Choose gloves to protect hands against chemicals depending on the concentration and quantity of the hazardous substance and specific to place of work. For special applications, we recommend clarifying the resistance to chemicals of the aforementioned protective gloves with the glove manufacturer. Wash hands before breaks and at the end of workday. Breakthrough time is not determined for the product. Change gloves often!

Skin and body protection : Wear the following personal protective equipment:
Flame retardant antistatic protective clothing, unless assessment demonstrates that the risk of explosive atmospheres or flash fires is low

Respiratory protection : Use respiratory protection unless adequate local exhaust ventilation is provided or exposure assessment demonstrates that exposures are within recommended exposure guidelines.

Filter type : Organic gas and low boiling vapour type (AX)

Protective measures : Wear cold insulating gloves/ face shield/ eye protection.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

Appearance	:	Liquefied gas
Colour	:	colourless
Odour	:	slight, ether-like
Odour Threshold	:	No data available
pH	:	No data available
Melting point/freezing point	:	No data available
Initial boiling point and boiling range	:	-50.9 °C
Flash point	:	Not applicable
Evaporation rate	:	> 1 (CCL4=1.0)
Flammability (solid, gas)	:	Flammable
Upper explosion limit / Upper flammability limit	:	Upper flammability limit 22 %(V) Method: ASTM E681
Lower explosion limit / Lower flammability limit	:	Lower flammability limit 11.25 %(V) Method: ASTM E681
Vapour pressure	:	15,856 hPa (25 °C)
Relative vapour density	:	2.2 (Air = 1.0)
Relative density	:	0.98 (25 °C)
Density	:	0.98 g/cm3 (25 °C) (as liquid)
Solubility(ies)		
Water solubility	:	No data available
Partition coefficient: n-octanol/water	:	Not applicable
Auto-ignition temperature	:	No data available
Decomposition temperature	:	No data available

Viscosity
Viscosity, kinematic : Not applicable

Explosive properties : Not explosive

Oxidizing properties : The substance or mixture is not classified as oxidizing.

9.2 Other information

Particle size : Not applicable

SECTION 10: Stability and reactivity

10.1 Reactivity

Not classified as a reactivity hazard.

10.2 Chemical stability

Stable if used as directed. Follow precautionary advice and avoid incompatible materials and conditions.

10.3 Possibility of hazardous reactions

Hazardous reactions : Vapours may form flammable mixture with air
Can react with strong oxidizing agents.
Flammable gas.

10.4 Conditions to avoid

Conditions to avoid : Heat, flames and sparks.

10.5 Incompatible materials

Materials to avoid : Oxidizing agents

10.6 Hazardous decomposition products

No hazardous decomposition products are known.

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Information on likely routes of exposure : Inhalation
Skin contact
Eye contact

Acute toxicity

Not classified based on available information.

Components:

Difluoromethane:

Acute inhalation toxicity : LC50 (Rat): > 520000 ppm
Exposure time: 4 h
Test atmosphere: gas

Lowest observed adverse effect concentration (Dog): > 350000 ppm
Symptoms: Cardiac sensitisation

No observed adverse effect concentration (Dog): 350000 ppm
Symptoms: Cardiac sensitisation

Cardiac sensitisation threshold limit (Dog): > 735,000 mg/m3
Symptoms: Cardiac sensitisation

2,3,3,3-Tetrafluoropropene:

Acute inhalation toxicity : LC50 (Rat): > 405000 ppm
Exposure time: 4 h
Test atmosphere: gas

Lowest observed adverse effect concentration (Dog): > 120000 ppm
Test atmosphere: gas
Symptoms: Cardiac sensitisation

No observed adverse effect concentration (Dog): 120000 ppm
Test atmosphere: gas
Symptoms: Cardiac sensitisation

Cardiac sensitisation threshold limit (Dog): > 559,509 mg/m3
Test atmosphere: gas
Symptoms: Cardiac sensitisation

Skin corrosion/irritation

Not classified based on available information.

Components:

Difluoromethane:

Species : Not tested on animals
Result : No skin irritation

2,3,3,3-Tetrafluoropropene:

Species : Not tested on animals
Result : No skin irritation

Serious eye damage/eye irritation

Not classified based on available information.

Components:

Difluoromethane:

Species : Not tested on animals
Result : No eye irritation

2,3,3,3-Tetrafluoropropene:

Species	:	Not tested on animals
Result	:	No eye irritation

Respiratory or skin sensitisation

Skin sensitisation

Not classified based on available information.

Respiratory sensitisation

Not classified based on available information.

Components:

Difluoromethane:

Exposure routes	:	Skin contact
Species	:	Not tested on animals
Result	:	negative
Species	:	Not tested on animals
Result	:	negative

2,3,3,3-Tetrafluoropropene:

Exposure routes	:	Skin contact
Species	:	Not tested on animals
Result	:	negative

Germ cell mutagenicity

Not classified based on available information.

Components:

Difluoromethane:

Germ cell mutagenicity- Assessment	:	Weight of evidence does not support classification as a germ cell mutagen.

2,3,3,3-Tetrafluoropropene:

Germ cell mutagenicity- Assessment	:	Weight of evidence does not support classification as a germ cell mutagen.

Carcinogenicity

Not classified based on available information.

Components:

2,3,3,3-Tetrafluoropropene:

Carcinogenicity - Assessment	:	Weight of evidence does not support classification as a carcinogen

Reproductive toxicity

Not classified based on available information.

Components:

Difluoromethane:

Reproductive toxicity - Assessment	:	Weight of evidence does not support classification for reproductive toxicity, Based on data from similar materials

2,3,3,3-Tetrafluoropropene:

Reproductive toxicity - Assessment	:	Weight of evidence does not support classification for reproductive toxicity

STOT - single exposure

Not classified based on available information.

STOT - repeated exposure

Not classified based on available information.

Components:

Difluoromethane:

Assessment	:	No significant health effects observed in animals at concentrations of 250 ppmV/6h/d or less.

2,3,3,3-Tetrafluoropropene:

Assessment	:	No significant health effects observed in animals at concentrations of 250 ppmV/6h/d or less.

Repeated dose toxicity

Components:

Difluoromethane:

Species	:	Rat
NOAEL	:	49100 ppm
Application Route	:	inhalation (gas)
Exposure time	:	90 d
Remarks	:	No significant adverse effects were reported

2,3,3,3-Tetrafluoropropene:

Species	:	Rat
NOAEL	:	50000 ppm
LOAEL	:	>50000 ppm
Application Route	:	inhalation (gas)
Exposure time	:	90 d
Method	:	OECD Test Guideline 413
Remarks	:	No significant adverse effects were reported

Aspiration toxicity

Not classified based on available information.

SECTION 12: Ecological information

12.1 Toxicity

Components:

Difluoromethane:

Toxicity to fish	:	LC50 (Fish): 1,507 mg/l Exposure time: 96 h
Toxicity to daphnia and other aquatic invertebrates	:	EC50 (Daphnia (water flea)): 652 mg/l Exposure time: 48 h
Toxicity to algae	:	EC50 (algae): 142 mg/l Exposure time: 96 h
Toxicity to fish (Chronic toxicity)	:	NOEC: 65.8 mg/l Exposure time: 30 d Species: Fish

2,3,3,3-Tetrafluoropropene:

Toxicity to fish	:	LC50 (Cyprinus carpio (Carp)): > 197 mg/l Exposure time: 96 h
Toxicity to daphnia and other aquatic invertebrates	:	EC50 (Daphnia magna (Water flea)): > 100 mg/l Exposure time: 48 h
Toxicity to algae	:	NOEC (algae): > 100 mg/l Exposure time: 72 h

12.2 Persistence and degradability

Components:

Difluoromethane:

Biodegradability	:	Result: Not readily biodegradable. Biodegradation: 5 % Exposure time: 28 d Method: OECD Test Guideline 301D

2,3,3,3-Tetrafluoropropene:

Biodegradability	:	Result: Not readily biodegradable. Method: OECD Test Guideline 301F

12.3 Bioaccumulative potential

Components:

Difluoromethane:

Partition coefficient: n-octanol/water	:	log Pow: 0.714

2,3,3,3-Tetrafluoropropene:

Bioaccumulation : Remarks: No bioaccumulation is to be expected (log Pow <= 4).

12.4 Mobility in soil

No data available

12.5 Results of PBT and vPvB assessment

Product:

Assessment : This mixture contains no substance considered to be persistent, bioaccumulating and toxic (PBT).. This mixture contains no substance considered to be very persistent and very bioaccumulating (vPvB)..

12.6 Other adverse effects

Global warming potential

Regulation (EU) No 517/2014 on fluorinated greenhouse gases

Product:

100-year global warming potential: 466

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product : Dispose of in accordance with local regulations.
According to the European Waste Catalogue, Waste Codes are not product specific, but application specific.
Waste codes should be assigned by the user, preferably in discussion with the waste disposal authorities.

Contaminated packaging : Empty containers should be taken to an approved waste handling site for recycling or disposal.
Empty pressure vessels should be returned to the supplier.
Empty containers retain residue and can be dangerous.
Do not pressurize, cut, weld, braze, solder, drill, grind, or expose such containers to heat, flame, sparks, or other sources of ignition. They may explode and cause injury and/or death.
If not otherwise specified: Dispose of as unused product.

SECTION 14: Transport information

14.1 UN number

ADN : UN 3161

ADR : UN 3161

RID : UN 3161

IMDG	:	UN 3161
IATA (Cargo)	:	UN 3161
IATA (Passenger)	:	UN 3161 Not permitted for transport

14.2 UN proper shipping name

ADN	:	LIQUEFIED GAS, FLAMMABLE, N.O.S. (Difluoromethane, 2,3,3,3-Tetrafluoropropene)
ADR	:	LIQUEFIED GAS, FLAMMABLE, N.O.S. (Difluoromethane, 2,3,3,3-Tetrafluoropropene)
RID	:	LIQUEFIED GAS, FLAMMABLE, N.O.S. (Difluoromethane, 2,3,3,3-Tetrafluoropropene)
IMDG	:	LIQUEFIED GAS, FLAMMABLE, N.O.S. (Difluoromethane, 2,3,3,3-Tetrafluoropropene)
IATA (Cargo)	:	Liquefied gas, flammable, n.o.s. (Difluoromethane, 2,3,3,3-Tetrafluoropropene)
IATA (Passenger)	:	LIQUEFIED GAS, FLAMMABLE, N.O.S. Not permitted for transport

14.3 Transport hazard class(es)

ADN	:	2
ADR	:	2
RID	:	2
IMDG	:	2.1
IATA (Cargo)	:	2.1
IATA (Passenger)	:	Not permitted for transport

14.4 Packing group

ADN

Packing group	:	Not assigned by regulation
Classification Code	:	2F
Hazard Identification Number	:	23
Labels	:	2.1

ADR

Packing group	:	Not assigned by regulation
Classification Code	:	2F
Hazard Identification Number	:	23
Labels	:	2.1
Tunnel restriction code	:	(B/D)

RID

Packing group	:	Not assigned by regulation
Classification Code	:	2F
Hazard Identification Number	:	23
Labels	:	2.1 ((13))

IMDG

Packing group	:	Not assigned by regulation
Labels	:	2.1
EmS Code	:	F-D, S-U

IATA (Cargo)

Packing instruction (cargo aircraft)	:	200
Packing group	:	Not assigned by regulation
Labels	:	Flammable Gas
IATA (Passenger)	:	Not permitted for transport

14.5 Environmental hazards

ADN
Environmentally hazardous : no

ADR
Environmentally hazardous : no

RID
Environmentally hazardous : no

IMDG
Marine pollutant : no

14.6 Special precautions for user

The transport classification(s) provided herein are for informational purposes only, and solely based upon the properties of the unpackaged material as it is described within this Safety Data Sheet. Transportation classifications may vary by mode of transportation, package sizes, and variations in regional or country regulations.

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

Remarks : Not applicable for product as supplied.

SECTION 15: Regulatory information

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

REACH - Candidate List of Substances of Very High Concern for Authorisation (Article 59).	:	Not applicable
REACH - List of substances subject to authorisation (Annex XIV)	:	Not applicable
Regulation (EC) No 1005/2009 on substances that deplete the ozone layer	:	Not applicable
Regulation (EC) No 850/2004 on persistent organic pollutants	:	Not applicable
Regulation (EC) No 649/2012 of the European Parliament and the Council concerning the export and import of dangerous chemicals	:	Not applicable
REACH - Restrictions on the manufacture, placing on the market and use of certain dangerous substances,	:	Not applicable

preparations and articles (Annex XVII)

Seveso III: Directive 2012/18/EU of the European Parliament and of the Council on the control of major-accident hazards involving dangerous substances.
P2 FLAMMABLE GASES

Other regulations:

Take note of Directive 94/33/EC on the protection of young people at work or stricter national regulations, where applicable.

15.2 Chemical safety assessment

Chemical Safety Assessments have been carried out for these substances.

SECTION 16: Other information

Other information	:	Opteon™ and any associated logos are trademarks or copyrights of The Chemours Company FC, LLC. Chemours™ and the Chemours Logo are trademarks of The Chemours Company. Before use read Chemours safety information. For further information contact the local Chemours office or nominated distributors. Items where changes have been made to the previous version are highlighted in the body of this document by two vertical lines.

Full text of H-Statements

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

Full text of other abbreviations

Flam. Gas	:	Flammable gases
Press. Gas	:	Gases under pressure

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; AICS - Australian Inventory of Chemical Substances; ASTM - American Society for the Testing of Materials; bw - Body weight; CLP - Classification Labelling Packaging Regulation; Regulation (EC) No 1272/2008; CMR - Carcinogen, Mutagen or Reproductive Toxicant; DIN - Standard of the German Institute for Standardisation; DSL - Domestic Substances List (Canada); ECHA - European Chemicals Agency; EC-Number - European Community number; ECx - Concentration associated with x% response; ELx - Loading rate associated with x% response; EmS - Emergency Schedule; ENCS - Existing and New Chemical Substances (Japan); ErCx - Concentration associated with x% growth rate response; GHS - Globally Harmonized System; GLP - Good Laboratory Practice; IARC - International Agency for Research on Cancer; IATA - International Air Transport Association; IBC - International Code for the Construction and Equipment of Ships carrying Dangerous Chemicals in Bulk; IC50 - Half maximal inhibitory concentration; ICAO - International Civil Aviation Organization; IECSC - Inventory of Existing Chemical Substances in China; IMDG - International Maritime Dangerous Goods; IMO - International Maritime Organization; ISHL - Industrial Safety and Health Law (Japan); ISO - International Organisation for Standardization; KECI - Korea Existing Chemicals Inventory; LC50 - Lethal Concentration

to 50 % of a test population; LD50 - Lethal Dose to 50% of a test population (Median Lethal Dose); MARPOL - International Convention for the Prevention of Pollution from Ships; n.o.s. - Not Otherwise Specified; NO(A)EC - No Observed (Adverse) Effect Concentration; NO(A)EL - No Observed (Adverse) Effect Level; NOELR - No Observable Effect Loading Rate; NZIoC - New Zealand Inventory of Chemicals; OECD - Organization for Economic Co-operation and Development; OPPTS - Office of Chemical Safety and Pollution Prevention; PBT - Persistent, Bioaccumulative and Toxic substance; PICCS - Philippines Inventory of Chemicals and Chemical Substances; (Q)SAR - (Quantitative) Structure Activity Relationship; REACH - Regulation (EC) No 1907/2006 of the European Parliament and of the Council concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals; RID - Regulations concerning the International Carriage of Dangerous Goods by Rail; SADT - Self-Accelerating Decomposition Temperature; SDS - Safety Data Sheet; SVHC - Substance of Very High Concern; TCSI - Taiwan Chemical Substance Inventory; TRGS - Technical Rule for Hazardous Substances; TSCA - Toxic Substances Control Act (United States); UN - United Nations; vPvB - Very Persistent and Very Bioaccumulative

Further information

Sources of key data used to compile the Safety Data Sheet	:	Internal technical data, data from raw material SDSs, OECD eChem Portal search results and European Chemicals Agency, http://echa.europa.eu/

Classification of the mixture:		**Classification procedure:**
Flam. Gas 1	H220	Based on product data or assessment
Press. Gas Liquefied gas	H280	Based on product data or assessment

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and shall not be considered a warranty or quality specification of any type. The information provided relates only to the specific material identified at the top of this SDS and may not be valid when the SDS material is used in combination with any other materials or in any process, unless specified in the text. Material users should review the information and recommendations in the specific context of their intended manner of handling, use, processing and storage, including an assessment of the appropriateness of the SDS material in the user's end product, if applicable.

GB / EN