

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

1.1. Product identifier

Product form : Mixture
Name : R-453A
Product code : 102453000
Synonyms : RS-70

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

Relevant identified uses

Use of the substance/mixture : Refrigerant

1.3. Details of the supplier of the safety data sheet

Supplier

Dehon Service SAS
26 Avenue du Petit Parc
94683 VINCENNES Cedex
France
T 01 43 98 75 00, F 01 43 98 21 51
ContactFDS@climalife.dehon.com

Other

Climalife Kft Budepesta sucursală Bucuresti Romania
Bulevardul Hristo Botev, Nr. 28,
Biroul NR 4, Modulul I
Bucuresti Sectorul 3
Romania
ContactFDS@climalife.dehon.com

Other

Dehon Kälte-Fachvertriebs GmbH
Robert-Bosch-Strasse 14
40668 MEERBUSCH
Germany
T 00 49 2150 7073 0, F 00 49 2150 7073 17
ContactFDS@climalife.dehon.com

Other

Dehon Service Belgium s.a/n.v.
Avenue Carton de Wiart, 79
1090 Bruxelles
Belgium
T 00 32 2 421 01 70, F 00 32 2 426 96 62
ContactFDS@climalife.dehon.com

Other

Friogas sa
Poligono Industrial SEPES
Parcela 10
46500 SAGUNTO (Valencia)
Spain
T 00 34 9 6 266 36 32, F 00 34 9 6 266 50 25
ContactFDS@climalife.dehon.com

Other

Prochimac SA
ZI Petits Champs 15
CH-1400 Yverdon-les-Bains
Switzerland
T 00 41 32 727 36 00, F 00 41 32 727 36 19
ContactFDS@climalife.dehon.com

Other

Other

Climalife Hongrie Kft.
Villányi út 47
1118 Budapest
Hungary
T (36) 23 431 660
ContactFDS@climalife.dehon.com

Other

Climalife Supplied by Inventec Performance Chemicals Italia SRL
Via del Lavoro, 10/G
20874 Busnago MB
Italia
T +39 39-5973480, F +39 39-5973490
ContactFDS@climalife.dehon.com

Other

Dehon nordic service
Östra Hamngatan 50B 3tr
41109 GÖTEBORG
Sweden
T 00 46 735 01 90 50
ContactFDS@climalife.dehon.com

Other

Dehon Service Netherland B.V.
Van Konijnenburgweg 84
NL-4612 PL Bergen Op Zoom
Netherlands
T 00 31 164 212 830, F 00 31 164 212 831
ContactFDS@climalife.dehon.com

Other

IDS Refrigeration Limited
22 Apex Court, Woodlands, Bradley Stoke
BS32 4JT Bristol
United Kingdom
T 00 44 1179 802520, F 00 44 1179 802521
ContactFDS@climalife.dehon.com

Other

Galco s.a/n.v.
Avenue Carton de Wiart, 79
1090 BRUSSELS
Belgium
T 00 32 2 421 01 84, F 00 32 2 421 01 84 / 00 32 2 425 38 12
ContactFDS@climalife.dehon.com

Other

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Climalife Asia Corporation
Room 302-A82, No.3, Building 1509, Xin Zhen Road,
201101 Shanghai , Minhang District
China
T +86 21 6442 3972 , F +86 21 6442 3952
ContactFDS@climalife.dehon.com

Galco Singapore Branch
135 Cecil Street #10-01
Singapore
ContactFDS@climalife.dehon.com

Other

Teknalys Middle East FZCO
B34BS33O203, Jebel Ali Freezone
Dubai
United Arab Emirates
ContactFDS@climalife.dehon.com

1.4. Emergency telephone number

Emergency number : +33 (0) 1 72 11 00 03

Country/Area	Organisation/Company	Address	Emergency number	Comment
Ireland	National Poisons Information Centre Beaumont Hospital	PO Box 1297 Beaumont Road 9 Dublin	+353 1 809 2566 (Healthcare professionals- 24/7) +353 1 809 2166 (public, 8am - 10pm, 7/7)	
United Kingdom	National Poisons Information Service (Birmingham Centre) City Hospital	Dudley Road B18 7QH	0344 892 0111	Only for healthcare professionals

SECTION 2: Hazards identification

2.1. Classification of the substance or mixture

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

Press. Gas (Liq.) H280
Full text of hazard classes, H- and EUH-statements: see section 16

Adverse physicochemical, human health and environmental effects

Vapours are heavier than air and can cause suffocation by reducing oxygen available for breathing. Contact with the liquid may cause frostbite and serious damage to eyes.

2.2. Label elements

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

Hazard pictograms (CLP)



GHS04

Signal word (CLP) : Warning
Hazard statements (CLP) : H280 - Contains gas under pressure; may explode if heated.
Precautionary statements (CLP) : P403 - Store in a well-ventilated place.
Extra phrases : Greenhouse fluorinated gas falling within Kyoto Protocol (GWP = 1765).

2.3. Other hazards

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

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Component	
Substance(s) not meeting the PBT criteria of REACH regulation, in accordance with Annex XIII	1,1,1,2-Tetrafluoroethane (811-97-2), Pentafluoroethane (354-33-6), 1,1,1,2,3,3,3-heptafluoropropane (431-89-0), isopentane (78-78-4), n-Butane (106-97-8)
Substance(s) not meeting the vPvB criteria of REACH regulation, in accordance with Annex XIII	1,1,1,2-Tetrafluoroethane (811-97-2), Pentafluoroethane (354-33-6), 1,1,1,2,3,3,3-heptafluoropropane (431-89-0), isopentane (78-78-4), n-Butane (106-97-8)

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

SECTION 3: Composition/information on ingredients

3.2. Mixtures

Name	Product identifier	%	Classification according to Regulation (EC) No. 1272/2008 [CLP]
1,1,1,2-Tetrafluoroethane	CAS-No.: 811-97-2 EC-No.: 212-377-0 REACH-no: 01-2119459374-33	53.8	Press. Gas (Liq.), H280
Pentafluoroethane	CAS-No.: 354-33-6 EC-No.: 206-557-8 REACH-no: 01-2119485636-25	20	Press. Gas (Liq.), H280
Difluoromethane	CAS-No.: 75-10-5 EC-No.: 200-839-4 REACH-no: 01-2119471312-47	20	Flam. Gas 1B, H221 Press. Gas (Liq.), H280
1,1,1,2,3,3,3-heptafluoropropane	CAS-No.: 431-89-0 EC-No.: 207-079-2 REACH-no: 01-2119485489-18	5	Press. Gas (Liq.), H280
isopentane	CAS-No.: 78-78-4 EC-No.: 201-142-8 EC Index-No.: 601-085-00-2 REACH-no: 01-2119475602-38	0.6	Flam. Liq. 1, H224 Asp. Tox. 1, H304 STOT SE 3, H336 Aquatic Chronic 2, H411 EUH066
n-Butane	CAS-No.: 106-97-8 EC-No.: 203-448-7 EC Index-No.: 601-004-00-0 REACH-no: 01-2119474691-32	0.6	Flam. Gas 1A, H220 Press. Gas (Liq.), H280

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

SECTION 4: First aid measures

4.1. Description of first aid measures

First-aid measures after inhalation	: Move the affected person away from the contaminated area and into the fresh air. If you feel unwell, seek medical advice.
First-aid measures after skin contact	: In the event of contact with the liquid: treat resulting frostbite as a burn. Immediately remove contaminated clothing or footwear. Immediately rinse with plenty of water. If skin burns appear, call a doctor immediately.

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First-aid measures after eye contact	: Rinse immediately and thoroughly, pulling the eyelids well away from the eye (15 minutes minimum). Consult an eye specialist immediately.
First-aid measures after ingestion	: Not specifically applicable (gas).

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

Symptoms/effects	: CNS depression. Narcosis. Cardiac disorders. Lack of oxygen: risk of death.
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4.3. Indication of any immediate medical attention and special treatment needed

No additional information available

SECTION 5: Firefighting measures

5.1. Extinguishing media

Suitable extinguishing media	: All extinguishing agents can be used.
Unsuitable extinguishing media	: None to our knowledge. If there is a fire close by, use suitable extinguishing agents.

5.2. Special hazards arising from the substance or mixture

Explosion hazard	: pressure rise and possible bursting of container. On heating : Toxic and corrosive vapours are released.
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5.3. Advice for firefighters

Firefighting instructions	: Use water spray or fog for cooling exposed containers.
Protection during firefighting	: Self-contained breathing apparatus. Complete protective clothing.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

General measures	: Avoid contact with skin and eyes. Remove all sources of ignition. Do not smoke. Evacuate the danger area. Do not breathe smoke. Stop the leak.
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For non-emergency personnel

Emergency procedures	: Evacuate area.
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For emergency responders

Emergency procedures	: Evacuate the danger area.
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6.2. Environmental precautions

No additional information available

6.3. Methods and material for containment and cleaning up

Other information	: Mechanically ventilate the spillage area.
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6.4. Reference to other sections

For further information refer to section 8: "Exposure controls/personal protection". For disposal of solid materials or residues refer to section 13 : "Disposal considerations".

SECTION 7: Handling and storage

7.1. Precautions for safe handling

Precautions for safe handling	: Avoid breathing mist, vapours. Do not get in eyes, on skin, or on clothing. Ventilation. Vapours are heavier than air and may spread along floors. Under certain temperature and pressure conditions may form a flammable mixture in the presence of air.
Hygiene measures	: Do not drink, eat or smoke in the workplace.

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7.2. Conditions for safe storage, including any incompatibilities

Storage conditions	: Store : in a cool, well-ventilated area, away from any source of heat, away from any source of ignition.
Incompatible materials	: Strong oxidizing agents. Alkaline hydroxide. Alkaline earth metals. Finely divided metals (Al, Mg, Zn).
Packaging materials	: Recommended materials Stainless steel, Carbon steel. Do not use : Alloys containing more than 2% magnesium, Plastic materials.

7.3. Specific end use(s)

No additional information available

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

National occupational exposure and biological limit values

1,1,1,2-Tetrafluoroethane (811-97-2)	
EU - Indicative Occupational Exposure Limit (IOEL)	
IOEL TWA	4240 mg/m ³
	1000 ppm
United Kingdom - Occupational Exposure Limits	
Local name	1,1,1,2-Tetrafluoroethane (HFC 134a)
WEL TWA (OEL TWA)	4240 mg/m ³
	1000 ppm
Regulatory reference	EH40/2005 (Fourth edition, 2020). HSE
Pentafluoroethane (354-33-6)	
EU - Indicative Occupational Exposure Limit (IOEL)	
IOEL TWA	4900 mg/m ³ (recommended)
	1000 ppm (recommended)
Difluoromethane (75-10-5)	
EU - Indicative Occupational Exposure Limit (IOEL)	
IOEL TWA	2200 mg/m ³ (recommended)
	1000 ppm (recommended)
1,1,1,2,3,3,3-heptafluoropropane (431-89-0)	
EU - Indicative Occupational Exposure Limit (IOEL)	
	No specific limit
isopentane (78-78-4)	
EU - Indicative Occupational Exposure Limit (IOEL)	
IOEL TWA	3000 mg/m ³
	1000 ppm
United Kingdom - Occupational Exposure Limits	
WEL TWA (OEL TWA)	1800 mg/m ³
	600 ppm

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n-Butane (106-97-8)	
Ireland - Occupational Exposure Limits	
Local name	Butane
OEL TWA	1000 ppm
OEL STEL	1000 ppm
Regulatory reference	Chemical Agents Code of Practice 2021
United Kingdom - Occupational Exposure Limits	
Local name	Butane
WEL TWA (OEL TWA)	1450 mg/m³
	600 ppm
WEL STEL (OEL STEL)	1810 mg/m³
	750 ppm
Remark	Carc (Capable of causing cancer and/or heritable genetic damage. See paragraphs 49–51), (only applies if Butane contains more than 0.1% of buta-1,3-diene)
Regulatory reference	EH40/2005 (Fourth edition, 2020). HSE
DNEL and PNEC	
1,1,1,2-Tetrafluoroethane (811-97-2)	
DNEL/DMEL (Workers)	
Long-term - systemic effects, inhalation	13936 mg/m³
DNEL/DMEL (General population)	
Long-term - systemic effects, inhalation	2476 mg/m³
PNEC (Water)	
PNEC aqua (freshwater)	0.1 mg/l
PNEC aqua (marine water)	0.01 mg/l
PNEC aqua (intermittent, freshwater)	1 mg/l
PNEC (Sediment)	
PNEC sediment (freshwater)	0.75 mg/kg dwt
PNEC (STP)	
PNEC sewage treatment plant	73 mg/l
Pentafluoroethane (354-33-6)	
DNEL/DMEL (Workers)	
Long-term - systemic effects, inhalation	16444 mg/m³
DNEL/DMEL (General population)	
Long-term - systemic effects, inhalation	1753 mg/m³
PNEC (Water)	
PNEC aqua (freshwater)	0.1 mg/l
PNEC aqua (intermittent, freshwater)	1 mg/l
PNEC (Sediment)	
PNEC sediment (freshwater)	0.6 mg/kg dwt

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Difluoromethane (75-10-5)	
DNEL/DMEL (Workers)	
Long-term - systemic effects, inhalation	7035 mg/m³
DNEL/DMEL (General population)	
Long-term - systemic effects, inhalation	750 mg/m³
PNEC (Water)	
PNEC aqua (freshwater)	0.142 mg/l
PNEC (Sediment)	
PNEC sediment (freshwater)	0.534 mg/kg dwt
1,1,1,2,3,3,3-heptafluoropropane (431-89-0)	
DNEL/DMEL (Workers)	
Long-term - systemic effects, inhalation	61279 mg/m³
DNEL/DMEL (General population)	
Long-term - systemic effects, inhalation	6533 mg/m³
PNEC (Water)	
PNEC aqua (freshwater)	0.1 mg/l
PNEC aqua (intermittent, freshwater)	1 mg/l
PNEC (Sediment)	
PNEC sediment (freshwater)	1.3 mg/kg dwt
PNEC (STP)	
PNEC sewage treatment plant	1.73 mg/l
isopentane (78-78-4)	
DNEL/DMEL (Workers)	
Long-term - systemic effects, dermal	432 mg/kg bodyweight/day
Long-term - systemic effects, inhalation	3000 mg/m³
DNEL/DMEL (General population)	
Long-term - systemic effects, oral	214 mg/kg bodyweight/day
Long-term - systemic effects, inhalation	643 mg/m³
Long-term - systemic effects, dermal	214 mg/kg bodyweight/day

8.2. Exposure controls

Personal protection equipment

Eye and face protection

Eye protection:

Safety glasses with side shields

Skin protection

Skin and body protection:

Majority cotton protective clothing

Hand protection:

Leather protective gloves. Nitrile-rubber protective gloves. VITON gloves

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Respiratory protection

Respiratory protection:

In the event of insufficient ventilation: Gas mask with filter type AX. In a confined area : Self-contained breathing apparatus

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

Physical state	: Gas
Colour	: Colourless.
Appearance	: Liquefied gas.
Molecular mass	: 88.8 g/mol
Odour	: slightly ethereal.
Odour threshold	: Not available
Melting point	: Not applicable
Freezing point	: Not applicable
Boiling point	: -42.2 °C
Flammability	: Non flammable.
Explosive properties	: Not explosive material according to EC criteria.
Oxidising properties	: Non oxidizing material according to EC criteria.
Lower explosion limit	: Not available
Upper explosion limit	: Not available
Flash point	: None
Auto-ignition temperature	: Not available
Decomposition temperature	: Not available
pH	: Not applicable
Viscosity, kinematic	: Not applicable
Solubility	: Insoluble in water.
Partition coefficient n-octanol/water (Log Kow)	: Not available
Vapour pressure	: 11.2 bar (25°C)
Vapour pressure at 50°C	: Not available
Critical pressure	: 45.3 bar
Density	: 1136 kg/m³ (25°C)
Relative density	: Not applicable
Relative vapour density at 20°C	: Not available
Particle characteristics	: Not applicable

9.2. Other information

Information with regard to physical hazard classes

Critical temperature	: 87.9 °C
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Other safety characteristics

VOC content	: 100 %
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SECTION 10: Stability and reactivity

10.1. Reactivity

Decomposes on exposure to temperature rise.

10.2. Chemical stability

Stable at ambient temperature and under normal conditions of use.

10.3. Possibility of hazardous reactions

No information available. No polymerization.

10.4. Conditions to avoid

Avoid high temperatures. Avoid naked flame. Heating will cause a rise in pressure with a risk of bursting.

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10.5. Incompatible materials

Alkalis and caustic products, alkali metals. Alkaline earth metals. Finely divided metals (Al, Mg, Zn). Strong oxidizing agents.

10.6. Hazardous decomposition products

On thermal decomposition (pyrolysis), releases : Hydrogen fluoride, Carbon oxides (CO, CO₂), Fluorinated hydrocarbons, Carbonyl halogenides.

SECTION 11: Toxicological information

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

Acute toxicity (oral) : Not classified

Acute toxicity (dermal) : Not classified

Acute toxicity (inhalation) : Not classified

1,1,1,2-Tetrafluoroethane (811-97-2)

LC50 Inhalation - Rat [ppm]	> 500000 ppm/4h
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Pentafluoroethane (354-33-6)

LC50 Inhalation - Rat [ppm]	800000 ppm/4h
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Difluoromethane (75-10-5)

LC50 Inhalation - Rat [ppm]	> 520000 ppm/4h
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1,1,1,2,3,3,3-heptafluoropropane (431-89-0)

LC50 Inhalation - Rat [ppm]	> 788696 ppm Animal: rat, Guideline: OECD Guideline 403 (Acute Inhalation Toxicity)
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isopentane (78-78-4)

LD50 oral rat	> 5000 ml/kg
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LC50 Inhalation - Rat	> 25.3 mg/l/4h
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LC50 Inhalation - Rat (Vapours)	> 25.3 mg/l/4h
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n-Butane (106-97-8)

LC50 Inhalation - Rat	658 mg/l/4h
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LC50 Inhalation - Rat [ppm]	274200 ppm
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Skin corrosion/irritation : Not classified

pH: Not applicable

Additional information : Contact with the liquid causes frostbite

1,1,1,2-Tetrafluoroethane (811-97-2)

pH	Not applicable
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Pentafluoroethane (354-33-6)

pH	Not applicable
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Difluoromethane (75-10-5)

pH	N/A
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Serious eye damage/irritation : Not classified

pH: Not applicable

Additional information : Contact with the liquefied gas may cause severe ocular lesions

1,1,1,2-Tetrafluoroethane (811-97-2)

pH	Not applicable
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Pentafluoroethane (354-33-6)	
pH	Not applicable
Difluoromethane (75-10-5)	
pH	N/A
Respiratory or skin sensitisation	: Not classified
Germ cell mutagenicity	: Not classified
Carcinogenicity	: Not classified
1,1,1,2-Tetrafluoroethane (811-97-2)	
NOAEL (chronic, oral, animal/male, 2 years)	300 mg/kg bodyweight rat
Reproductive toxicity	: Not classified
Pentafluoroethane (354-33-6)	
NOAEL (animal/male, F0/P)	245 mg/kg
NOAEL (animal/female, F0/P)	245 mg/kg
STOT-single exposure	: Not classified
isopentane (78-78-4)	
STOT-single exposure	May cause drowsiness or dizziness.
STOT-repeated exposure	: Not classified
1,1,1,2-Tetrafluoroethane (811-97-2)	
NOAEC (inhalation, rat, gas, 90 days)	50000 ppm Animal: rat, Guideline: OECD Guideline 453 (Combined Chronic Toxicity / Carcinogenicity Studies)
Pentafluoroethane (354-33-6)	
NOAEC (inhalation, rat, dust/mist/fume, 90 days)	50000 ppm
Difluoromethane (75-10-5)	
NOAEC (inhalation, rat, gas, 90 days)	50000 ppmv/6h/day
n-Butane (106-97-8)	
NOAEC (inhalation, rat, 28 days)	21.394 mg/l (Rat (Female, Male), inhalation (Gas), daily)
Aspiration hazard	: Not applicable
1,1,1,2-Tetrafluoroethane (811-97-2)	
Viscosity, kinematic	0.162 mm²/s
isopentane (78-78-4)	
Viscosity, kinematic	0.31 – 0.52 mm²/s

11.2. Information on other hazards

Endocrine disrupting properties

Adverse health effects caused by endocrine disrupting properties

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

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SECTION 12: Ecological information

12.1. Toxicity

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

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

1,1,1,2-Tetrafluoroethane (811-97-2)

LC50 - Fish [1]	450 mg/l Test organisms (species): Oncorhynchus mykiss (previous name: Salmo gairdneri)
EC50 - Crustacea [1]	980 mg/l 48 Hours (Daphnia magna)
EC50 72h - Algae [1]	> 118 mg/l Test organisms (species): Raphidocelis subcapitata (previous names: Pseudokirchneriella subcapitata, Selenastrum capricornutum)
EC50 72h - Algae [2]	> 114 mg/l Test organisms (species): Raphidocelis subcapitata (previous names: Pseudokirchneriella subcapitata, Selenastrum capricornutum)

Pentafluoroethane (354-33-6)

LC50 - Fish [1]	> 81.8 mg/l Test organisms (species): Oncorhynchus mykiss (previous name: Salmo gairdneri)
LC50 - Fish [2]	450 mg/l Test organisms (species): Oncorhynchus mykiss (previous name: Salmo gairdneri)
EC50 - Crustacea [1]	> 97.9 mg/l Test organisms (species): Daphnia magna
EC50 72h - Algae [1]	> 114 mg/l Test organisms (species): Raphidocelis subcapitata (previous names: Pseudokirchneriella subcapitata, Selenastrum capricornutum)
EC50 72h - Algae [2]	> 118 mg/l Test organisms (species): Raphidocelis subcapitata (previous names: Pseudokirchneriella subcapitata, Selenastrum capricornutum)
NOEC chronic fish	32 mg/l Test organisms (species): Duration: '30 d'

Difluoromethane (75-10-5)

LC50 - Fish [1]	> 81.8 mg/l Test organisms (species): Oncorhynchus mykiss (previous name: Salmo gairdneri)
EC50 - Crustacea [1]	> 97.9 mg/l Test organisms (species): Daphnia magna
EC50 - Crustacea [2]	> 97.9 mg/l Daphnia magna
EC50 72h - Algae [1]	> 118 mg/l Test organisms (species): Raphidocelis subcapitata (previous names: Pseudokirchneriella subcapitata, Selenastrum capricornutum)
EC50 72h - Algae [2]	> 114 mg/l Test organisms (species): Raphidocelis subcapitata (previous names: Pseudokirchneriella subcapitata, Selenastrum capricornutum)
EC50 96h - Algae [1]	313 mg/l

1,1,1,2,3,3,3-heptafluoropropane (431-89-0)

LC50 - Fish [1]	> 81.8 mg/l Test organisms (species): Oncorhynchus mykiss (previous name: Salmo gairdneri)
LC50 - Fish [2]	> 81.8
EC50 - Crustacea [1]	> 97.9 mg/l Test organisms (species): Daphnia magna
EC50 72h - Algae [1]	> 114 mg/l Test organisms (species): Raphidocelis subcapitata (previous names: Pseudokirchneriella subcapitata, Selenastrum capricornutum)
NOEC chronic fish	10 mg/l

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isopentane (78-78-4)	
LC50 - Fish [1]	4.26 mg/l (Oncorhynchus mykiss)
LC50 - Fish [2]	34.05 mg/l (Oncorhynchus mykiss) QSAR modelled data.
EC50 - Crustacea [1]	2.3 mg/l (Daphnia magna)
EC50 - Crustacea [2]	59.44 mg/l (Daphnia magna) QSAR modelled data.
EC50 72h - Algae [1]	25.12 mg/l (Pseudokirchnerella subcapitata) QSAR modelled data.
EC50 72h - Algae [2]	10.7 mg/l (Pseudokirchnerella subcapitata)
NOEC chronic fish	7.618 mg/l (Oncorhynchus mykiss) QSAR modelled data.
NOEC chronic crustacea	13.29 mg/l
NOEC chronic algae	5.62 mg/l
n-Butane (106-97-8)	
LC50 - Fish [1]	27.98 mg/l (Fish, minnows)
EC50 96h - Algae [1]	7.71 mg/l (algae)

12.2. Persistence and degradability

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Persistence and degradability	Not established.
1,1,1,2-Tetrafluoroethane (811-97-2)	
Persistence and degradability	Photodegradation in the air :, Half-life in air : 9,7 y, 3 % biodegradation after 28 days.
Pentafluoroethane (354-33-6)	
Persistence and degradability	5 % biodegradation after 28 days, Not readily biodegradable.
Difluoromethane (75-10-5)	
Persistence and degradability	Rapidly degradable
Biodegradation	5 %
1,1,1,2,3,3,3-heptafluoropropane (431-89-0)	
Persistence and degradability	Not readily biodegradable, 1 % biodegradation after 28 days, Half-life in air : 25 y.
isopentane (78-78-4)	
Persistence and degradability	% biodegradation after days, Photolysis in the air, Readily biodegradable in water.
n-Butane (106-97-8)	
Persistence and degradability	<60 % biodegradation après 28 jours.

12.3. Bioaccumulative potential

1,1,1,2-Tetrafluoroethane (811-97-2)	
Partition coefficient n-octanol/water (Log Pow)	1.06
Pentafluoroethane (354-33-6)	
Partition coefficient n-octanol/water (Log Kow)	1.48 (25°C)
Difluoromethane (75-10-5)	
Partition coefficient n-octanol/water (Log Pow)	0.21

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1,1,1,2,3,3,3-heptafluoropropane (431-89-0)

Partition coefficient n-octanol/water (Log Pow)	2.11
Partition coefficient n-octanol/water (Log Kow)	0.83

isopentane (78-78-4)

Partition coefficient n-octanol/water (Log Kow)	3.45
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n-Butane (106-97-8)

Partition coefficient n-octanol/water (Log Kow)	≥ 2.89
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12.4. Mobility in soil

1,1,1,2-Tetrafluoroethane (811-97-2)

Organic Carbon Normalized Adsorption Coefficient (Log Koc)	1.5
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Pentafluoroethane (354-33-6)

Organic Carbon Normalized Adsorption Coefficient (Log Koc)	1.3 – 1.7
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12.5. Results of PBT and vPvB assessment

Component

Substance(s) not meeting the PBT criteria of REACH regulation, in accordance with Annex XIII	1,1,1,2-Tetrafluoroethane (811-97-2), Pentafluoroethane (354-33-6), 1,1,1,2,3,3,3-heptafluoropropane (431-89-0), isopentane (78-78-4), n-Butane (106-97-8)
Substance(s) not meeting the vPvB criteria of REACH regulation, in accordance with Annex XIII	1,1,1,2-Tetrafluoroethane (811-97-2), Pentafluoroethane (354-33-6), 1,1,1,2,3,3,3-heptafluoropropane (431-89-0), isopentane (78-78-4), n-Butane (106-97-8)

12.6. Endocrine disrupting properties

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

12.7. Other adverse effects

Other adverse effects : ODP (R-11=1)=0.

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Other information	GWP (CO ₂ =1/100 years) = 1765
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1,1,1,2-Tetrafluoroethane (811-97-2)

Other information	GWP (CO ₂ =1/100 years) = 1430
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Pentafluoroethane (354-33-6)

Other information	GWP (CO ₂ =1/100 years) = 3500
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Difluoromethane (75-10-5)

Other information	GWP (CO ₂ =1/100 years) = 675
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SECTION 13: Disposal considerations





13.1. Waste treatment methods

Product/Packaging disposal recommendations : Methods of disposal of packaging. Reuse or recycle following decontamination. Destroy at an authorised site.

Additional information : The user's attention is drawn to the possible existence of specific european, national or local regulations regarding disposal.

SECTION 14: Transport information

In accordance with ADR / IMDG / IATA / RID

ADR	IMDG	IATA	RID
14.1. UN number or ID number			
UN 1078	UN 1078	UN 1078	UN 1078
14.2. UN proper shipping name			
REFRIGERANT GAS, N.O.S. (1,1,1,2-Tetrafluoroethane ; Pentafluoroethane ; Difluoromethane)	REFRIGERANT GAS, N.O.S. (1,1,1,2-Tetrafluoroethane ; Pentafluoroethane ; Difluoromethane)	Refrigerant gas, n.o.s. (1,1,1,2- Tetrafluoroethane ; Pentafluoroethane ; Difluoromethane)	REFRIGERANT GAS, N.O.S. (1,1,1,2-Tetrafluoroethane ; Pentafluoroethane ; Difluoromethane)
Transport document description			
UN 1078 REFRIGERANT GAS, N.O.S. (1,1,1,2-Tetrafluoroethane ; Pentafluoroethane ; Difluoromethane), 2.2, (C/E)	UN 1078 REFRIGERANT GAS, N.O.S. (1,1,1,2-Tetrafluoroethane ; Pentafluoroethane ; Difluoromethane), 2.2	UN 1078 Refrigerant gas, n.o.s. (1,1,1,2-Tetrafluoroethane ; Pentafluoroethane ; Difluoromethane), 2.2	UN 1078 REFRIGERANT GAS, N.O.S. (1,1,1,2-Tetrafluoroethane ; Pentafluoroethane ; Difluoromethane), 2.2
14.3. Transport hazard class(es)			
2.2	2.2	2.2	2.2
			
14.4. Packing group			
Not applicable	Not applicable	Not applicable	Not applicable
14.5. Environmental hazards			
Dangerous for the environment: No	Dangerous for the environment: No Marine pollutant: No EmS-No. (Fire): F-C EmS-No. (Spillage): S-V	Dangerous for the environment: No	Dangerous for the environment: No
No supplementary information available			

14.6. Special precautions for user

Overland transport

Classification code (ADR) : 2A

Special provisions (ADR) : 274, 582, 662

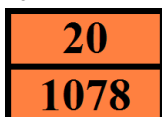
Limited quantities (ADR) : 120ml

Tank code (ADR) : PxBN(M)

Transport category (ADR) : 3

Hazard identification number (Kemler No.) : 20

Orange plates :



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Tunnel restriction code (ADR) : C/E
EAC code : 2TE

Transport by sea

Special provisions (IMDG) : 274
Limited quantities (IMDG) : 120 ml

Air transport

PCA Limited quantities (IATA) : Forbidden
PCA limited quantity max net quantity (IATA) : Forbidden
PCA packing instructions (IATA) : 200
PCA max net quantity (IATA) : 75kg
CAO packing instructions (IATA) : 200
CAO max net quantity (IATA) : 150kg

Rail transport

Classification code (RID) : 2A
Special provisions (RID) : 274, 582, 662
Limited quantities (RID) : 120ml
Tank codes for RID tanks (RID) : PxBN(M)
Transport category (RID) : 3
Colis express (express parcels) (RID) : CE3
Hazard identification number (RID) : 20

14.7. Maritime transport in bulk according to IMO instruments

Not applicable

SECTION 15: Regulatory information

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

EU-Regulations

Other information, restriction and prohibition regulations : * Regulation (EC) No 517/2014 : Greenhouse fluorinated gas falling within Kyoto Protocol.

REACH Annex XVII (Restriction List)

EU restriction list (REACH Annex XVII)	
Reference code	Applicable on
3(a)	isopentane
3(b)	isopentane
3(c)	isopentane

REACH Annex XIV (Authorisation List)

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

REACH Candidate List (SVHC)

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

PIC Regulation (Prior Informed Consent)

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

POP Regulation (Persistent Organic Pollutants)

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

Ozone Regulation (2024/590)

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

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

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

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VOC Directive (2004/42)

VOC content : 100 %

Explosives Precursors Regulation (2019/1148)

Contains no substance(s) listed on the Explosives Precursors list (Regulation EU 2019/1148 on the marketing and use of explosives precursors)

Drug Precursors Regulation (273/2004)

Contains no substance(s) listed on the Drug Precursors list (Regulation EC 273/2004 on the manufacture and the placing on market of certain substances used in the illicit manufacture of narcotic drugs and psychotropic substances)

National regulations

Ensure all national/local regulations are observed.

15.2. Chemical safety assessment

No additional information available

SECTION 16: Other information

Indication of changes		
Section	Changed item	Comments
	Adverse health effects caused by endocrine disrupting properties	Added
2.2	Extra phrases	Added
2.2	Precautionary statements (CLP)	Modified
3	Composition/information on ingredients	Modified
8.1	PNEC aqua (intermittent, freshwater)	Added
9	Molecular mass	Added
9	Critical pressure	Modified
9	Vapour pressure	Modified
9	VOC content	Added
9.1	Critical temperature	Modified
11.1	NOAEC (inhalation, rat, gas, 90 days)	Added
12.1	EC50 72h - Algae [2]	Added
12.2	Persistence and degradability	Added
12.6	Adverse effects on the environment caused by endocrine disrupting properties	Added
12.7	Other information	Modified
15.1	REACH Annex XVII	Added

Other information : For more information regarding the use of this product, please refer to our technical information or contact the sales department in your region.

Full text of H- and EUH-statements:	
Aquatic Chronic 2	Hazardous to the aquatic environment – Chronic Hazard, Category 2
Asp. Tox. 1	Aspiration hazard, Category 1
Flam. Gas 1A	Flammable gases, Category 1A
Flam. Gas 1B	Flammable gases, Category 1B

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Full text of H- and EUH-statements:

Flam. Liq. 1	Flammable liquids, Category 1
Press. Gas (Liq.)	Gases under pressure : Liquefied gas
STOT SE 3	Specific target organ toxicity – Single exposure, Category 3, Narcosis
H220	Extremely flammable gas.
H221	Flammable gas.
H224	Extremely flammable liquid and vapour.
H280	Contains gas under pressure; may explode if heated.
H304	May be fatal if swallowed and enters airways.
H336	May cause drowsiness or dizziness.
H411	Toxic to aquatic life with long lasting effects.
EUH066	Repeated exposure may cause skin dryness or cracking.

Safety Data Sheet (SDS), EU

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