

SAFETY DATA SHEET

According to REACH Regulation (EC) No 1907/2006, as amended by
UK REACH Regulations SI 2019/758



Opteon™ XP44 (R-452A) Refrigerant

Version	Revision Date:	SDS Number:	Date of last issue: -
1.0	16.08.2021	9243202-00001	Date of first issue: 16.08.2021

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

1.1 Product identifier

Trade name : Opteon™ XP44 (R-452A) Refrigerant

SDS-Identcode : 130000132272

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 : Consumer use, For professional users 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) as amended by GB-CLP Regulation, UK SI 2019/720, and UK SI 2020/1567)

Gases under pressure, Liquefied gas	H280: Contains gas under pressure; may explode if heated.
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2.2 Label elements

Labelling (REGULATION (EC) No 1272/2008) as amended by GB-CLP Regulation, UK SI 2019/720, and UK SI 2020/1567)

SAFETY DATA SHEET

According to REACH Regulation (EC) No 1907/2006, as amended by
UK REACH Regulations SI 2019/758



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Hazard pictograms :



Signal word : Warning

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

Precautionary statements : **Storage:**
P410 + P403 Protect from sunlight. Store in a well-ventilated place.

Additional Labelling

Contains fluorinated greenhouse gases. (HFC-125, HFC-32)

2.3 Other hazards

This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

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)
Pentafluoroethane#	354-33-6 206-557-8 01-2119485636-25	Press. Gas Liquefied gas; H280	59
2,3,3,3-Tetrafluoropropene#	754-12-1 468-710-7 01-0000019665-61	Flam. Gas 1B; H221 Press. Gas Liquefied gas; H280	30
Difluoromethane#	75-10-5 200-839-4 01-2119471312-47	Flam. Gas 1B; H221 Press. Gas Liquefied gas; H280	11

For explanation of abbreviations see section 16.

SAFETY DATA SHEET

According to REACH Regulation (EC) No 1907/2006, as amended by
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#: Voluntarily-disclosed non-hazardous substance

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.
If not breathing, give artificial respiration.
If breathing is difficult, give oxygen.
Get medical attention immediately. |
| 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 | : Gas reduces oxygen available for breathing.
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 | : Because of possible disturbances of cardiac rhythm, catecholamine drugs, such as epinephrine, that may be used in situations of emergency life support should be used with special caution. |
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SAFETY DATA SHEET

According to REACH Regulation (EC) No 1907/2006, as amended by
UK REACH Regulations SI 2019/758



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SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media : Not applicable
Will not burn

Unsuitable extinguishing media : Not applicable
Will not burn

5.2 Special hazards arising from the substance or mixture

Specific hazards during fire-fighting : 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 : Fluorine compounds
Carbon oxides
Hydrogen fluoride
carbonyl fluoride

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.
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.
Avoid skin contact with leaking liquid (danger of frostbite).
Ventilate the area.
Follow safe handling advice (see section 7) and personal protective equipment recommendations (see section 8).

6.2 Environmental precautions

Environmental precautions : Avoid release to the environment.
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.

SAFETY DATA SHEET

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Version	Revision Date:	SDS Number:	Date of last issue: -
1.0	16.08.2021	9243202-00001	Date of first issue: 16.08.2021

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 only with adequate ventilation. |
| Advice on safe handling | : | <p>Avoid breathing gas.</p> <p>Handle in accordance with good industrial hygiene and safety practice, based on the results of the workplace exposure assessment</p> <p>Wear cold insulating gloves/ face shield/ eye protection.</p> <p>Valve protection caps and valve outlet threaded plugs must remain in place unless container is secured with valve outlet piped to use point.</p> <p>Use a check valve or trap in the discharge line to prevent hazardous back flow into the cylinder.</p> <p>Prevent backflow into the gas tank.</p> <p>Use a pressure reducing regulator when connecting cylinder to lower pressure (<3000 psig) piping or systems.</p> <p>Close valve after each use and when empty. Do NOT change or force fit connections.</p> <p>Prevent the intrusion of water into the gas tank.</p> <p>Never attempt to lift cylinder by its cap.</p> <p>Do not drag, slide or roll cylinders.</p> <p>Use a suitable hand truck for cylinder movement.</p> <p>Keep away from heat and sources of ignition.</p> <p>Take precautionary measures against static discharges.</p> <p>Take care to prevent spills, waste and minimize release to the environment.</p> |
| Hygiene measures | : | If exposure to chemical is likely during typical use, provide eye flushing systems and safety showers 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 |
|---|---|--|

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According to REACH Regulation (EC) No 1907/2006, as amended by
UK REACH Regulations SI 2019/758



Opteon™ XP44 (R-452A) Refrigerant

Version	Revision Date:	SDS Number:	Date of last issue: -
1.0	16.08.2021	9243202-00001	Date of first issue: 16.08.2021

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 in a cool, well-ventilated place. Keep away from direct sunlight. Store in accordance with the particular national regulations.

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

Contains no substances with occupational exposure limit values.

Derived No Effect Level (DNEL):

Substance name	End Use	Exposure routes	Potential health effects	Value
Pentafluoroethane	Workers	Inhalation	Long-term systemic effects	16444 mg/m3
	Consumers	Inhalation	Long-term systemic effects	1753 mg/m3
2,3,3,3-Tetrafluoropropene	Workers	Inhalation	Long-term systemic effects	950 mg/m3
Difluoromethane	Workers	Inhalation	Long-term systemic effects	7035 mg/m3
	Consumers	Inhalation	Long-term systemic effects	750 mg/m3

SAFETY DATA SHEET

According to REACH Regulation (EC) No 1907/2006, as amended by
UK REACH Regulations SI 2019/758



Opteon™ XP44 (R-452A) Refrigerant

Version 1.0 Revision Date: 16.08.2021 SDS Number: 9243202-00001 Date of last issue: -
Date of first issue: 16.08.2021

Predicted No Effect Concentration (PNEC):

Substance name	Environmental Compartment	Value
Pentafluoroethane	Fresh water	0.1 mg/l
	Freshwater - intermittent	1 mg/l
	Fresh water sediment	0.6 mg/kg dry weight (d.w.)
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
Difluoromethane	Marine sediment	0.178 mg/kg dry weight (d.w.)
	Fresh water	0.142 mg/l
	Intermittent use/release	1.42 mg/l
	Fresh water sediment	0.534 mg/kg dry weight (d.w.)

8.2 Exposure controls

Engineering measures

Ensure adequate ventilation, especially in confined areas.
Minimize workplace exposure concentrations.

Personal protective equipment

Eye protection : Wear the following personal protective equipment:
Chemical resistant goggles must be worn.
Face-shield
Equipment should conform to BS EN 166

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 : Skin should be washed after contact.

Respiratory protection : If adequate local exhaust ventilation is not available or exposure assessment demonstrates exposures outside the recommended guidelines, use respiratory protection.
Equipment should conform to BS EN 14387

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

SAFETY DATA SHEET

According to REACH Regulation (EC) No 1907/2006, as amended by
UK REACH Regulations SI 2019/758



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Version	Revision Date:	SDS Number:	Date of last issue: -
1.0	16.08.2021	9243202-00001	Date of first issue: 16.08.2021

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	: clear, 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	: < -47.00 °C
Flash point	: Not applicable
Evaporation rate	: > 1 (CCL4=1.0)
Flammability (solid, gas)	: Will not burn
Upper explosion limit / Upper flammability limit	: Upper flammability limit Method: ASTM E681 None.
Lower explosion limit / Lower flammability limit	: Lower flammability limit Method: ASTM E681 None.
Vapour pressure	: 13,159 hPa (25 °C)
Relative vapour density	: 3.64 (Air = 1.0)
Relative density	: 1.13 (25 °C)
Solubility(ies) Water solubility	: No data available
Partition coefficient: n-octanol/water	: Not applicable
Auto-ignition temperature	: No data available

SAFETY DATA SHEET

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UK REACH Regulations SI 2019/758



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Version	Revision Date:	SDS Number:	Date of last issue: -
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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 : Can react with strong oxidizing agents.

10.4 Conditions to avoid

Conditions to avoid : This substance is not flammable in air at temperatures up to 100 °C (212 °F) at atmospheric pressure. However, mixtures of this substance with high concentrations of air at elevated pressure and/or temperature can become combustible in the presence of an ignition source. This substance can also become combustible in an oxygen enriched environment (oxygen concentrations greater than that in air). Whether a mixture containing this substance and air, or this substance in an oxygen enriched atmosphere become combustible depends on the inter-relationship of 1) the temperature 2) the pressure, and 3) the proportion of oxygen in the mixture. In general, this substance should not be allowed to exist with air above atmospheric pressure or at high temperatures; or in an oxygen enriched environment. For example this substance should NOT be mixed with air under pressure for leak testing or other purposes.
Heat, flames and sparks.

10.5 Incompatible materials

Materials to avoid : Avoid impurities (e.g. rust, dust, ash), risk of decomposition.
Incompatible with acids and bases.
Incompatible with oxidizing agents.
Oxygen
Peroxides
peroxide compounds

SAFETY DATA SHEET

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Powdered metals

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:

Pentafluoroethane:

Acute inhalation toxicity : LC50 (Rat): > 800000 ppm
Exposure time: 4 h
Test atmosphere: gas
Method: OECD Test Guideline 403

No observed adverse effect concentration (Dog): 75000 ppm
Remarks: Cardiac sensitisation

Cardiac sensitisation threshold limit (Dog): 368.159 mg/m³
Remarks: Cardiac sensitisation

2,3,3,3-Tetrafluoropropene:

Acute inhalation toxicity : LC50 (Rat): > 405800 ppm
Exposure time: 4 h
Test atmosphere: gas
Method: OECD Test Guideline 403

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

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

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

Difluoromethane:

Acute oral toxicity : Assessment: The substance or mixture has no acute oral tox-

SAFETY DATA SHEET

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UK REACH Regulations SI 2019/758



Opteon™ XP44 (R-452A) Refrigerant

Version	Revision Date:	SDS Number:	Date of last issue: -
1.0	16.08.2021	9243202-00001	Date of first issue: 16.08.2021

icity

Acute inhalation toxicity : LC50 (Rat): > 520000 ppm
Exposure time: 4 h
Test atmosphere: gas
Method: OECD Test Guideline 403

No observed adverse effect concentration (Dog): 350000 ppm
Test atmosphere: gas
Remarks: Cardiac sensitisation

Lowest observed adverse effect concentration (Dog): > 350000 ppm
Test atmosphere: gas
Remarks: Cardiac sensitisation

Cardiac sensitisation threshold limit (Dog): > 735,000 mg/m3
Test atmosphere: gas
Remarks: Cardiac sensitisation

Acute dermal toxicity : Assessment: The substance or mixture has no acute dermal toxicity

Skin corrosion/irritation

Not classified based on available information.

Components:

2,3,3,3-Tetrafluoropropene:

Result : No skin irritation

Difluoromethane:

Result : No skin irritation

Serious eye damage/eye irritation

Not classified based on available information.

Components:

2,3,3,3-Tetrafluoropropene:

Result : No eye irritation

Difluoromethane:

Result : No eye irritation

Respiratory or skin sensitisation

Skin sensitisation

Not classified based on available information.

SAFETY DATA SHEET

According to REACH Regulation (EC) No 1907/2006, as amended by
UK REACH Regulations SI 2019/758



Opteon™ XP44 (R-452A) Refrigerant

Version	Revision Date:	SDS Number:	Date of last issue: -
1.0	16.08.2021	9243202-00001	Date of first issue: 16.08.2021

Respiratory sensitisation

Not classified based on available information.

Components:

2,3,3,3-Tetrafluoropropene:

Exposure routes	:	Skin contact
Result	:	negative

Difluoromethane:

Exposure routes	:	Skin contact
Result	:	negative

Exposure routes	:	Inhalation
Result	:	negative

Germ cell mutagenicity

Not classified based on available information.

Components:

Pentafluoroethane:

Genotoxicity in vitro	:	Test Type: Bacterial reverse mutation assay (AMES) Method: OECD Test Guideline 471 Result: negative
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Test Type: In vitro mammalian cell gene mutation test
Result: negative
Remarks: Based on data from similar materials

Test Type: Chromosome aberration test in vitro
Method: OECD Test Guideline 473
Result: negative

Genotoxicity in vivo	:	Test Type: Mammalian erythrocyte micronucleus test (in vivo cytogenetic assay) Species: Mouse Application Route: inhalation (gas) Method: OECD Test Guideline 474 Result: negative
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2,3,3,3-Tetrafluoropropene:

Genotoxicity in vitro	:	Test Type: Bacterial reverse mutation assay (AMES) Method: OECD Test Guideline 471 Result: positive
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Test Type: Chromosome aberration test in vitro
Method: OECD Test Guideline 473
Result: negative

Genotoxicity in vivo	:	Test Type: Mammalian erythrocyte micronucleus test (in vivo)
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SAFETY DATA SHEET

According to REACH Regulation (EC) No 1907/2006, as amended by
UK REACH Regulations SI 2019/758



Opteon™ XP44 (R-452A) Refrigerant

Version	Revision Date:	SDS Number:	Date of last issue: -
1.0	16.08.2021	9243202-00001	Date of first issue: 16.08.2021

cytogenetic assay)
Species: Mouse
Application Route: inhalation (gas)
Method: OECD Test Guideline 474
Result: negative

Test Type: In vivo mammalian alkaline comet assay
Species: Rat
Application Route: inhalation (gas)
Method: OECD Test Guideline 489
Result: negative

Test Type: Mammalian erythrocyte micronucleus test (in vivo
cytogenetic assay)
Species: Rat
Application Route: inhalation (gas)
Method: OECD Test Guideline 474
Result: negative

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

Difluoromethane:

Genotoxicity in vitro : Test Type: Bacterial reverse mutation assay (AMES)
Method: OECD Test Guideline 471
Result: negative

Test Type: Chromosome aberration test in vitro
Method: OECD Test Guideline 473
Result: negative

Genotoxicity in vivo : Test Type: Mammalian erythrocyte micronucleus test (in vivo
cytogenetic assay)
Species: Mouse
Application Route: inhalation (gas)
Method: OECD Test Guideline 474
Result: negative

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:

Result : negative

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

SAFETY DATA SHEET

According to REACH Regulation (EC) No 1907/2006, as amended by
UK REACH Regulations SI 2019/758



Opteon™ XP44 (R-452A) Refrigerant

Version 1.0	Revision Date: 16.08.2021	SDS Number: 9243202-00001	Date of last issue: - Date of first issue: 16.08.2021
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Difluoromethane:

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

Reproductive toxicity

Not classified based on available information.

Components:

Pentafluoroethane:

Effects on fertility : Test Type: One-generation reproduction toxicity study
Species: Rat
Application Route: inhalation (vapour)
Result: negative
Remarks: Based on data from similar materials

Effects on foetal development : Test Type: Embryo-foetal development
Species: Rat
Application Route: inhalation (gas)
Method: OECD Test Guideline 414
Result: negative

2,3,3,3-Tetrafluoropropene:

Effects on fertility : Test Type: Two-generation reproduction toxicity study
Species: Rat
Application Route: inhalation (gas)
Method: OECD Test Guideline 416
Result: negative

Effects on foetal development : Test Type: Prenatal development toxicity study (teratogenicity)
Species: Rat
Application Route: inhalation (gas)
Method: OECD Test Guideline 414
Result: negative

Reproductive toxicity - Assessment : Weight of evidence does not support classification for reproductive toxicity, No effects on or via lactation

Difluoromethane:

Effects on fertility : Species: Mouse
Application Route: Inhalation
Result: negative
Remarks: Based on data from similar materials

Effects on foetal development : Test Type: Combined repeated dose toxicity study with the reproduction/developmental toxicity screening test
Species: Rat
Application Route: inhalation (gas)
Method: OECD Test Guideline 414
Result: negative

SAFETY DATA SHEET

According to REACH Regulation (EC) No 1907/2006, as amended by
UK REACH Regulations SI 2019/758



Opteon™ XP44 (R-452A) Refrigerant

Version	Revision Date:	SDS Number:	Date of last issue: -
1.0	16.08.2021	9243202-00001	Date of first issue: 16.08.2021

Test Type: Combined repeated dose toxicity study with the reproduction/developmental toxicity screening test

Species: Rabbit

Application Route: inhalation (gas)

Method: OECD Test Guideline 414

Result: negative

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

STOT - single exposure

Not classified based on available information.

Components:

2,3,3,3-Tetrafluoropropene:

Exposure routes : inhalation (gas)
Assessment : No significant health effects observed in animals at concentrations of 20000 ppmV/4h or less

Difluoromethane:

Exposure routes : inhalation (gas)
Assessment : No significant health effects observed in animals at concentrations of 20000 ppmV/4h or less

STOT - repeated exposure

Not classified based on available information.

Components:

2,3,3,3-Tetrafluoropropene:

Exposure routes : inhalation (gas)
Assessment : No significant health effects observed in animals at concentrations of 250 ppmV/6h/d or less.

Difluoromethane:

Exposure routes : inhalation (gas)
Assessment : No significant health effects observed in animals at concentrations of 250 ppmV/6h/d or less.

Repeated dose toxicity

Components:

Pentafluoroethane:

Species : Rat
NOAEL : ≥ 50000 ppm
Application Route : inhalation (gas)
Exposure time : 13 Weeks
Method : OECD Test Guideline 413

SAFETY DATA SHEET

According to REACH Regulation (EC) No 1907/2006, as amended by
UK REACH Regulations SI 2019/758



Opteon™ XP44 (R-452A) Refrigerant

Version	Revision Date:	SDS Number:	Date of last issue: -
1.0	16.08.2021	9243202-00001	Date of first issue: 16.08.2021

2,3,3,3-Tetrafluoropropene:

Species	: Rat, male and female
NOAEL	: 50000 ppm
LOAEL	: >50000 ppm
Application Route	: inhalation (gas)
Exposure time	: 13 Weeks
Method	: OECD Test Guideline 413

Difluoromethane:

Species	: Rat, male and female
NOAEL	: 49100 ppm
LOAEL	: > 49100 ppm
Application Route	: inhalation (gas)
Exposure time	: 13 Weeks
Method	: OECD Test Guideline 413

Aspiration toxicity

Not classified based on available information.

Components:

2,3,3,3-Tetrafluoropropene:

No aspiration toxicity classification

Difluoromethane:

No aspiration toxicity classification

SECTION 12: Ecological information

12.1 Toxicity

Components:

Pentafluoroethane:

Toxicity to fish	: LC50 (Oncorhynchus mykiss (rainbow trout)): > 100 mg/l Exposure time: 96 h Remarks: Based on data from similar materials
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Toxicity to daphnia and other aquatic invertebrates	: EC50 (Daphnia magna (Water flea)): > 100 mg/l Exposure time: 48 h Remarks: Based on data from similar materials
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Toxicity to algae/aquatic plants	: ErC50 (Pseudokirchneriella subcapitata (green algae)): > 100 mg/l Exposure time: 72 h Method: OECD Test Guideline 201 Remarks: Based on data from similar materials
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NOEC (Pseudokirchneriella subcapitata (green algae)): > 1 mg/l

SAFETY DATA SHEET

According to REACH Regulation (EC) No 1907/2006, as amended by
UK REACH Regulations SI 2019/758



Opteon™ XP44 (R-452A) Refrigerant

Version	Revision Date:	SDS Number:	Date of last issue: -
1.0	16.08.2021	9243202-00001	Date of first issue: 16.08.2021

Exposure time: 72 h
Method: OECD Test Guideline 201
Remarks: Based on data from similar materials

2,3,3,3-Tetrafluoropropene:

Toxicity to fish : LC50 (Cyprinus carpio (Carp)): > 197 mg/l
Exposure time: 96 h
Method: OECD Test Guideline 203

Toxicity to daphnia and other aquatic invertebrates : EC50 (Daphnia magna (Water flea)): > 100 mg/l
Exposure time: 48 h
Method: OECD Test Guideline 202

Toxicity to algae/aquatic plants : EC50 (Selenastrum capricornutum (green algae)): > 100 mg/l
Exposure time: 72 h
Method: OECD Test Guideline 201

NOEC (Selenastrum capricornutum (green algae)): > 75 mg/l
Exposure time: 3 d
Method: OECD Test Guideline 201

Difluoromethane:

Toxicity to fish : LC50 (Fish): 1,507 mg/l
Exposure time: 96 h
Method: ECOSAR (Ecological Structure Activity Relationships)

Toxicity to daphnia and other aquatic invertebrates : EC50 (Daphnia (water flea)): 652 mg/l
Exposure time: 48 h
Method: ECOSAR (Ecological Structure Activity Relationships)

Toxicity to algae/aquatic plants : EC50 (green algae): 142 mg/l
Exposure time: 96 h
Method: ECOSAR (Ecological Structure Activity Relationships)

12.2 Persistence and degradability

Components:

Pentafluoroethane:

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

SAFETY DATA SHEET

According to REACH Regulation (EC) No 1907/2006, as amended by
UK REACH Regulations SI 2019/758



Opteon™ XP44 (R-452A) Refrigerant

Version	Revision Date:	SDS Number:	Date of last issue: -
1.0	16.08.2021	9243202-00001	Date of first issue: 16.08.2021

Difluoromethane:

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

12.3 Bioaccumulative potential

Components:

Pentafluoroethane:

Partition coefficient: n-octanol/water : Pow: 1.48
Method: OECD Test Guideline 107

2,3,3,3-Tetrafluoropropene:

Bioaccumulation : Remarks: Bioaccumulation is unlikely.

Partition coefficient: n-octanol/water : log Pow: 2 (25 °C)

Difluoromethane:

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

12.4 Mobility in soil

No data available

12.5 Results of PBT and vPvB assessment

Product:

Assessment : This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

12.6 Endocrine disrupting properties

Product:

Assessment : The substance/mixture does not contain components considered to have endocrine disrupting properties according to REACH Article 57(f) or Commission Delegated regulation (EU) 2017/2100 or Commission Regulation (EU) 2018/605 at levels of 0.1% or higher.

12.7 Other adverse effects

Global warming potential

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

SAFETY DATA SHEET

According to REACH Regulation (EC) No 1907/2006, as amended by
UK REACH Regulations SI 2019/758



Opteon™ XP44 (R-452A) Refrigerant

Version	Revision Date:	SDS Number:	Date of last issue: -
1.0	16.08.2021	9243202-00001	Date of first issue: 16.08.2021

Product:

100-year global warming potential: 2,140

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.
If not otherwise specified: Dispose of as unused product. |

SECTION 14: Transport information

14.1 UN number

- | | |
|------|-----------|
| ADN | : UN 1078 |
| ADR | : UN 1078 |
| RID | : UN 1078 |
| IMDG | : UN 1078 |
| IATA | : UN 1078 |

14.2 UN proper shipping name

- | | |
|------|--|
| ADN | : REFRIGERANT GAS, N.O.S.
(Pentafluoroethane, 2,3,3,3-Tetrafluoropropene) |
| ADR | : REFRIGERANT GAS, N.O.S.
(Pentafluoroethane, 2,3,3,3-Tetrafluoropropene) |
| RID | : REFRIGERANT GAS, N.O.S.
(Pentafluoroethane, 2,3,3,3-Tetrafluoropropene) |
| IMDG | : REFRIGERANT GAS, N.O.S.
(Pentafluoroethane, 2,3,3,3-Tetrafluoropropene) |
| IATA | : Refrigerant gas, n.o.s.
(Pentafluoroethane, 2,3,3,3-Tetrafluoropropene) |

14.3 Transport hazard class(es)

- | | |
|------|-------|
| ADN | : 2 |
| ADR | : 2 |
| RID | : 2 |
| IMDG | : 2.2 |

SAFETY DATA SHEET

According to REACH Regulation (EC) No 1907/2006, as amended by
UK REACH Regulations SI 2019/758



Opteon™ XP44 (R-452A) Refrigerant

Version	Revision Date:	SDS Number:	Date of last issue: -
1.0	16.08.2021	9243202-00001	Date of first issue: 16.08.2021

IATA : 2.2

14.4 Packing group

ADN

Packing group : Not assigned by regulation
Classification Code : 2A
Hazard Identification Number : 20
Labels : 2.2

ADR

Packing group : Not assigned by regulation
Classification Code : 2A
Hazard Identification Number : 20
Labels : 2.2
Tunnel restriction code : (C/E)

RID

Packing group : Not assigned by regulation
Classification Code : 2A
Hazard Identification Number : 20
Labels : 2.2 ((13))

IMDG

Packing group : Not assigned by regulation
Labels : 2.2
EmS Code : F-C, S-V

IATA (Cargo)

Packing instruction (cargo aircraft) : 200
Packing group : Not assigned by regulation
Labels : Non-flammable, non-toxic Gas

IATA (Passenger)

Packing instruction (passenger aircraft) : 200
Packing group : Not assigned by regulation
Labels : Non-flammable, non-toxic Gas

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

SAFETY DATA SHEET

According to REACH Regulation (EC) No 1907/2006, as amended by
UK REACH Regulations SI 2019/758



Opteon™ XP44 (R-452A) Refrigerant

Version	Revision Date:	SDS Number:	Date of last issue: -
1.0	16.08.2021	9243202-00001	Date of first issue: 16.08.2021

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

Relevant EU provisions transposed through retained EU law

REACH - Restrictions on the manufacture, placing on the market and use of certain dangerous substances, preparations and articles (Annex XVII) : Not applicable

REACH - Candidate List of Substances of Very High Concern for Authorisation (Article 59). : Not applicable

Regulation (EC) No 1005/2009 on substances that deplete the ozone layer : Not applicable

Regulation (EU) 2019/1021 on persistent organic pollutants (recast) : Not applicable

Regulation (EC) No 649/2012 of the European Parliament and the Council concerning the export and import of dangerous chemicals : Not applicable

UK REACH List of substances subject to authorisation (Annex XIV) : Not applicable

Seveso III: Directive 2012/18/EU of the European Parliament and of the Council on the control of major-accident hazards involving dangerous substances.
Not 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.

SAFETY DATA SHEET

According to REACH Regulation (EC) No 1907/2006, as amended by
UK REACH Regulations SI 2019/758



Opteon™ XP44 (R-452A) Refrigerant

Version	Revision Date:	SDS Number:	Date of last issue: -
1.0	16.08.2021	9243202-00001	Date of first issue: 16.08.2021

Full text of H-Statements

H221 : 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; AIIIC - Australian Inventory of Industrial Chemicals; 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; TECI - Thailand Existing Chemicals Inventory; TSCA - Toxic Substances Control Act (United States); UN - United Nations; UNRTDG - United Nations Recommendations on the Transport of Dangerous Goods; 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:

Press. Gas Liquefied gas H280

Classification procedure:

Based on product data or assessment

SAFETY DATA SHEET

According to REACH Regulation (EC) No 1907/2006, as amended by
UK REACH Regulations SI 2019/758



Opteon™ XP44 (R-452A) Refrigerant

Version	Revision Date:	SDS Number:	Date of last issue: -
1.0	16.08.2021	9243202-00001	Date of first issue: 16.08.2021

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