

SAFETY DATA SHEET



Vertrel™ SFR specialty fluid

Version	Revision Date:	SDS Number:	Date of last issue: 2024/10/16
6.1	2025/03/05	1333547-00043	Date of first issue: 2017/02/27

1. PRODUCT AND COMPANY IDENTIFICATION

Product name : Vertrel™ SFR specialty fluid

SDS-Identcode : 130000033961

Other means of identification : None

Recommended use of the chemical and restrictions on use

Recommended use : Cleaning agent

Restrictions on use : For professional and industrial installation and use only.

Manufacturer or supplier's details

Company : The Chemours (Taiwan) Company Limited

Address : 7F., No. 167, Dunhua N. Rd., Songshan Dist., Taipei City 105, Taiwan

Telephone : 0080-112-7758

Emergency telephone number : 0800 055 119 (in case of chemical spill, fire or poisoning accident)

Telefax : 02-2719-8516

2. HAZARDS IDENTIFICATION

GHS Classification

Skin corrosion/irritation : Category 3

Serious eye damage/eye irritation : Category 2B

Specific target organ toxicity - single exposure : Category 2 (optic nerve, Central nervous system)

Specific target organ toxicity - single exposure : Category 3

Short-term (acute) aquatic hazard : Category 3

Long-term (chronic) aquatic hazard : Category 3

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GHS label elements

Hazard pictograms



Signal word

: Warning

Hazard statements

: H316 Causes mild skin irritation.
H320 Causes eye irritation.
H336 May cause drowsiness or dizziness.
H371 May cause damage to organs (optic nerve, Central nervous system).
H412 Harmful to aquatic life with long lasting effects.

Precautionary statements

: **Prevention:**

P260 Do not breathe mist or vapours.
P264 Wash skin thoroughly after handling.
P270 Do not eat, drink or smoke when using this product.
P271 Use only outdoors or in a well-ventilated area.
P273 Avoid release to the environment.

Response:

P304 + P340 + P312 IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER/ doctor if you feel unwell.
P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P308 + P311 IF exposed or concerned: Call a POISON CENTER/ doctor.
P332 + P313 If skin irritation occurs: Get medical advice/ attention.
P337 + P313 If eye irritation persists: Get medical advice/ attention.

Storage:

P405 Store locked up.

Disposal:

P501 Dispose of contents/ container to an approved waste disposal plant.

Other hazards which do not result in classification

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.

In use, may form flammable/explosive vapour-air mixture.

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3. COMPOSITION/INFORMATION ON INGREDIENTS

Substance / Mixture : Mixture

Components

Hazardous ingredients	CAS-No.	Concentration (% w/w)
Trans-Dichloroethylene	156-60-5	>= 50 -< 70
Reaction mass of (3R,4R)-1,1,1,2,2,3,4,5,5,5-decafluoropentane and (3S,4S)-1,1,1,2,2,3,4,5,5,5-decafluoropentane	138495-42-8	>= 10 -< 20
1,1,2,2,3,3,4-Heptafluorocyclopentane	15290-77-4	>= 10 -< 20
Methanol	67-56-1	>= 1 -< 10

4. 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.

First aid measures for different exposure routes

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

In case of skin contact : In case of contact, immediately flush skin with plenty of water.
Remove contaminated clothing and shoes.
Get medical attention.
Wash clothing before reuse.
Thoroughly clean shoes before reuse.

In case of eye contact : In case of contact, immediately flush eyes with plenty of water for at least 15 minutes.
If easy to do, remove contact lens, if worn.
Get medical attention.

If swallowed : If swallowed, DO NOT induce vomiting.
Get medical attention if symptoms occur.
Rinse mouth thoroughly with water.

Most important symptoms and effects, both acute and delayed : May cause cardiac arrhythmia.
Skin contact may provoke the following symptoms:
Dermatitis
Irritation
Pain
superficial burning sensation
Itching
Redness
Swelling of tissue
Rash

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Discomfort
Eye contact may provoke the following symptoms
Irritation
tearing
Discomfort
Redness
Effects of breathing high concentrations of vapour may include:
Tiredness
Drowsiness
central nervous system effects
Convulsions
Dizziness
confusion
Adverse effects from repeated inhalation may include
central nervous system effects
Aspiration may cause pulmonary oedema and pneumonitis.
Causes mild skin irritation.
Causes eye irritation.
May cause drowsiness or dizziness.
May cause damage to organs.

Protection of first-aiders	:	First Aid responders should pay attention to self-protection, and use the recommended personal protective equipment when the potential for exposure exists (see section 8).
Notes to physician	:	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.

5. FIREFIGHTING MEASURES

Suitable extinguishing media	:	Water spray Alcohol-resistant foam Carbon dioxide (CO ₂) Dry chemical
Unsuitable extinguishing media	:	None known.
Specific hazards during fire-fighting	:	Vapours may form explosive mixtures with air. Exposure to combustion products may be a hazard to health.
Hazardous combustion products	:	Carbon oxides Chlorine compounds Hydrogen fluoride carbonyl fluoride Fluorine compounds

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- Specific extinguishing methods : Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.
Use water spray to cool unopened containers.
Remove undamaged containers from fire area if it is safe to do so.
Evacuate area.
- Special protective equipment for firefighters : In the event of fire, wear self-contained breathing apparatus.
Use personal protective equipment.

6. ACCIDENTAL RELEASE MEASURES

- Personal precautions, protective equipment and emergency procedures : Use personal protective equipment.
Follow safe handling advice (see section 7) and personal protective equipment recommendations (see section 8).
- Environmental precautions : Avoid release to the environment.
Prevent further leakage or spillage if safe to do so.
Prevent spreading over a wide area (e.g. by containment or oil barriers).
Retain and dispose of contaminated wash water.
Local authorities should be advised if significant spillages cannot be contained.
- Methods and materials for containment and cleaning up : Soak up with inert absorbent material.
For large spills, provide dyking or other appropriate containment to keep material from spreading. If dyked material can be pumped, store recovered material in appropriate container.
Clean up remaining materials from spill with suitable absorbent.
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.

7. HANDLING AND STORAGE

Handling

- Technical measures : See Engineering measures under EXPOSURE CONTROLS/PERSONAL PROTECTION section.
- Local/Total ventilation : If sufficient ventilation is unavailable, use with local exhaust ventilation.
If advised by assessment of the local exposure potential, use only in an area equipped with explosion-proof exhaust ventila-

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tion.

Advice on safe handling : Do not get on skin or clothing.
Avoid breathing mist or vapours.
Do not swallow.
Do not get in eyes.
Wash skin thoroughly after handling.
Handle in accordance with good industrial hygiene and safety practice, based on the results of the workplace exposure assessment
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.

Storage

Conditions for safe storage : Do not expose drums to direct heat or temperature above 46°C (115°F) to avoid pressurizing and possibly distorting the drums.
Material should not be dispensed by pouring from pail/drum shipping containers containing 5 gallons or more. The use of a drum pump is recommended for dispensing from pail/drum shipping containers with 5 gallons or more, except for smaller containers where adequate ventilation can be used to manage the exposure.
Keep in properly labelled containers.
Store locked up.
Keep in a cool, well-ventilated place.
Store in accordance with the particular national regulations.

Materials to avoid : No special restrictions on storage with other products.

Recommended storage temperature : < 46 °C

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

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Components with workplace control parameters

Components	CAS-No.	Value type (Form of exposure)	Control parameters / Permissible concentration	Basis
Trans-Dichloroethylene	156-60-5	TWA	200 ppm	ACGIH
Reaction mass of (3R,4R)-1,1,1,2,2,3,4,5,5,5-decafluoropentane and (3S,4S)- 1,1,1,2,2,3,4,5,5,5-decafluoropentane	138495-42-8	TWA	225 ppm 2,320 mg/m3	WEEL

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		STEL	700 ppm 7,217 mg/m ³	WEEL
Methanol	67-56-1	TWA	200 ppm 262 mg/m ³	TW OEL
Further information: Skin				
		STEL	250 ppm 327.5 mg/m ³	TW OEL
Further information: Skin				
		TWA	200 ppm	ACGIH
		STEL	250 ppm	ACGIH

Biological occupational exposure limits

Components	CAS-No.	Control parameters	Biological specimen	Sampling time	Permissible concentration	Basis
Methanol	67-56-1	Methanol	Urine	End of shift (As soon as possible after exposure ceases)	15 mg/l	ACGIH BEI

Engineering measures : Minimize workplace exposure concentrations.
If sufficient ventilation is unavailable, use with local exhaust ventilation.
If advised by assessment of the local exposure potential, use only in an area equipped with explosion-proof exhaust ventilation.

Personal protective equipment

Respiratory protection : Use a positive pressure air supplied respirator if there is any potential for uncontrolled release, exposure levels are unknown.

Hand protection
Material : Viton®
Glove thickness : 0.7 mm
Wearing time : 120 min

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!

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Eye protection	: Wear the following personal protective equipment: Safety goggles
Skin and body protection	: Wear the following personal protective equipment: If assessment demonstrates that there is a risk of explosive atmospheres or flash fires, use flame retardant antistatic protective clothing.
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.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	: liquid
Colour	: colourless, clear
Odour	: slight, pleasant
Odour Threshold	: No data available
pH	: No data available
Melting point/freezing point	: < -50 °C
Initial boiling point and boiling range	: 41 °C
Flash point	: Method: Pensky-Martens closed cup does not flash
Evaporation rate	: No data available
Flammability (solid, gas)	: Not applicable
Flammability (liquids)	: No data available
Upper explosion limit / Upper flammability limit	: Upper flammability limit 15 %(V) Method: ASTM E681
Lower explosion limit / Lower flammability limit	: Lower flammability limit 7 %(V) Method: ASTM E681

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Vapour pressure	: 579 hPa (25 °C)
Relative vapour density	: 2.4
Density	: 1.28 g/cm ³ (25 °C)
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	: No data available
Explosive properties	: In use may form flammable/explosive vapour-air mixture.
Oxidizing properties	: The substance or mixture is not classified as oxidizing.
Particle characteristics	
Particle size	: Not applicable

10. STABILITY AND REACTIVITY

Reactivity	: Not classified as a reactivity hazard.
Chemical stability	: Stable under normal conditions.
Possibility of hazardous reactions	: Vapours may form flammable mixture with air In use may form flammable/explosive vapour-air mixture.
Conditions to avoid	: None known.
Incompatible materials	: None.
Hazardous decomposition products	: No hazardous decomposition products are known.

11. TOXICOLOGICAL INFORMATION

Exposure routes	: Inhalation Skin contact Ingestion Eye contact
Symptoms of Overexposure	: May cause cardiac arrhythmia.

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Skin contact may provoke the following symptoms:

Dermatitis
Irritation
Pain
superficial burning sensation
Itching
Redness
Swelling of tissue
Rash
Discomfort

Eye contact may provoke the following symptoms

Irritation
tearing
Discomfort

Redness

Effects of breathing high concentrations of vapour may include:

Tiredness
Drowsiness
central nervous system effects
Convulsions
Dizziness
confusion

Adverse effects from repeated inhalation may include
central nervous system effects

Aspiration may cause pulmonary oedema and pneumonitis.

Acute toxicity

Not classified based on available information.

Product:

Acute oral toxicity : Acute toxicity estimate: > 5,000 mg/kg
Method: Calculation method

Acute inhalation toxicity : Acute toxicity estimate: > 40 mg/l
Exposure time: 4 h
Test atmosphere: vapour
Method: Calculation method

Acute dermal toxicity : Acute toxicity estimate: > 5,000 mg/kg
Method: Calculation method

Components:

Trans-Dichloroethylene:

Acute oral toxicity : LD50 (Rat): 7,902 mg/kg
Method: OECD Test Guideline 420

Acute inhalation toxicity : LC50 (Rat): 95.5 mg/l

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Exposure time: 4 h
Test atmosphere: vapour
Method: OECD Test Guideline 403

Lowest observed adverse effect concentration (Dog): 250000 ppm
Test atmosphere: gas

Cardiac sensitisation threshold limit (Dog): 991,309 mg/m³
Test atmosphere: gas

Acute dermal toxicity : LD50 (Rabbit): > 5,000 mg/kg
Method: OECD Test Guideline 402

Reaction mass of (3R,4R)-1,1,1,2,2,3,4,5,5,5-decafluoropentane and (3S,4S)- 1,1,1,2,2,3,4,5,5,5-decafluoropentane

:

Acute oral toxicity : LD50 (Rat): > 5,000 mg/kg
Method: OECD Test Guideline 401

Acute inhalation toxicity : LC50 (Rat): 114.428 mg/l
Exposure time: 4 h
Test atmosphere: vapour
Method: OECD Test Guideline 403

No observed adverse effect concentration (Dog): 5000 ppm
Test atmosphere: gas
Method: Cardiac sensitisation study

Lowest observed adverse effect concentration (Dog): > 5000 ppm
Test atmosphere: gas
Method: Cardiac sensitisation study

Cardiac sensitisation threshold limit (Dog): > 51,544 mg/m³
Test atmosphere: gas
Method: Cardiac sensitisation study

Acute dermal toxicity : LD50 (Rabbit): > 5,000 mg/kg
Method: OECD Test Guideline 402

1,1,2,2,3,3,4-Heptafluorocyclopentane:

Acute oral toxicity : LD50 (Rat): > 2,000 mg/kg

Methanol:

Acute oral toxicity : Acute toxicity estimate (Humans): 300 mg/kg
Method: Expert judgement

Acute inhalation toxicity : Acute toxicity estimate: 3 mg/l

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Exposure time: 4 h
Test atmosphere: vapour
Method: Expert judgement
Remarks: Based on national or regional regulation.

Acute dermal toxicity : Acute toxicity estimate: 300 mg/kg
Method: Expert judgement
Remarks: Based on national or regional regulation.

Skin corrosion/irritation

Causes mild skin irritation.

Components:

Trans-Dichloroethylene:

Species : Rabbit
Method : OECD Test Guideline 404
Result : Mild skin irritation

Reaction mass of (3R,4R)-1,1,1,2,2,3,4,5,5,5-decafluoropentane and (3S,4S)- 1,1,1,2,2,3,4,5,5,5-decafluoropentane

:

Species : Rabbit
Method : OECD Test Guideline 404
Result : No skin irritation

1,1,2,2,3,3,4-Heptafluorocyclopentane:

Species : Rabbit
Result : No skin irritation

Methanol:

Species : Rabbit
Result : No skin irritation

Serious eye damage/eye irritation

Causes eye irritation.

Components:

Trans-Dichloroethylene:

Species : Rabbit
Result : Irritation to eyes, reversing within 7 days
Method : OECD Test Guideline 405

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Reaction mass of (3R,4R)-1,1,1,2,2,3,4,5,5,5-decafluoropentane and (3S,4S)- 1,1,1,2,2,3,4,5,5,5-decafluoropentane

:

Species	:	Rabbit
Result	:	No eye irritation
Method	:	OECD Test Guideline 405

1,1,2,2,3,3,4-Heptafluorocyclopentane:

Species	:	Rabbit
Result	:	No eye irritation

Methanol:

Species	:	Rabbit
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:

Reaction mass of (3R,4R)-1,1,1,2,2,3,4,5,5,5-decafluoropentane and (3S,4S)- 1,1,1,2,2,3,4,5,5,5-decafluoropentane

:

Test Type	:	Buehler Test
Exposure routes	:	Skin contact
Species	:	Guinea pig
Method	:	OECD Test Guideline 406
Result	:	negative

1,1,2,2,3,3,4-Heptafluorocyclopentane:

Test Type	:	Maximisation Test
Exposure routes	:	Skin contact
Species	:	Guinea pig
Result	:	negative

Methanol:

Test Type	:	Maximisation Test
Exposure routes	:	Skin contact
Species	:	Guinea pig
Result	:	negative

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Chronic toxicity

Germ cell mutagenicity

Not classified based on available information.

Components:

Trans-Dichloroethylene:

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

Test Type: In vitro mammalian cell gene mutation test
Method: OECD Test Guideline 476
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: Ingestion
Method: OECD Test Guideline 474
Result: negative

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

Reaction mass of (3R,4R)-1,1,1,2,2,3,4,5,5,5-decafluoropentane and (3S,4S)- 1,1,1,2,2,3,4,5,5,5-decafluoropentane

:

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

Test Type: In vitro mammalian cell gene mutation test
Method: OECD Test Guideline 476
Result: negative

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

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

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1,1,2,2,3,3,4-Heptafluorocyclopentane:

Genotoxicity in vitro : Test Type: Bacterial reverse mutation assay (AMES)
Result: negative

Methanol:

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

Test Type: In vitro mammalian cell gene mutation test
Result: negative

Test Type: in vitro micronucleus test
Result: negative

Genotoxicity in vivo : Test Type: Mammalian erythrocyte micronucleus test (in vivo cytogenetic assay)
Species: Mouse
Application Route: Intraperitoneal injection
Result: negative

Carcinogenicity

Not classified based on available information.

Components:

Methanol:

Species : Monkey
Application Route : inhalation (vapour)
Exposure time : 7 Months
Result : negative

Reproductive toxicity

Not classified based on available information.

Components:

Trans-Dichloroethylene:

Effects on foetal development : Test Type: Embryo-foetal development
Species: Rat
Application Route: Inhalation
Method: OECD Test Guideline 414
Result: negative

Reaction mass of (3R,4R)-1,1,1,2,2,3,4,5,5,5-decafluoropentane and (3S,4S)- 1,1,1,2,2,3,4,5,5,5-decafluoropentane

:
Effects on fertility : Test Type: One-generation reproduction toxicity study
Species: Rat

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Application Route: inhalation (vapour)
Method: OECD Test Guideline 415
Result: negative

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

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

Methanol:

Effects on fertility : Test Type: One-generation reproduction toxicity study
Species: Monkey
Application Route: inhalation (vapour)
Result: negative

Effects on foetal development : Test Type: Reproduction/Developmental toxicity screening test
Species: Monkey
Application Route: inhalation (vapour)
Result: negative

STOT - single exposure

May cause drowsiness or dizziness.

May cause damage to organs (optic nerve, Central nervous system).

Components:

Trans-Dichloroethylene:

Assessment : May cause drowsiness or dizziness.

Reaction mass of (3R,4R)-1,1,1,2,2,3,4,5,5,5-decafluoropentane and (3S,4S)- 1,1,1,2,2,3,4,5,5,5-decafluoropentane

:

Exposure routes : Ingestion
Assessment : No significant health effects observed in animals at concentrations of 2000 mg/kg bw or less

Exposure routes : Skin contact
Assessment : No significant health effects observed in animals at concentrations of 2000 mg/kg bw or less

Exposure routes : inhalation (vapour)
Assessment : No significant health effects observed in animals at concentrations of 20 mg/l/4h or less

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Methanol:

Target Organs	: optic nerve, Central nervous system
Assessment	: Causes damage to organs.

STOT - repeated exposure

Not classified based on available information.

Components:

Trans-Dichloroethylene:

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

Exposure routes	: Ingestion
Assessment	: No significant health effects observed in animals at concentrations of 100 mg/kg bw or less.

Reaction mass of (3R,4R)-1,1,1,2,2,3,4,5,5,5-decafluoropentane and (3S,4S)- 1,1,1,2,2,3,4,5,5,5-decafluoropentane

:

Exposure routes	: inhalation (vapour)
Assessment	: No significant health effects observed in animals at concentrations of 1 mg/l/6h/d or less.

Repeated dose toxicity

Components:

Trans-Dichloroethylene:

Species	: Rat, male and female
NOAEL	: 4000 ppm
LOAEL	: > 4000 ppm
Application Route	: Inhalation
Exposure time	: 90 Days
Method	: OECD Test Guideline 413

Species	: Rat, male and female
NOAEL	: 3,210 mg/kg
LOAEL	: > 3,210 mg/kg
Application Route	: Ingestion
Exposure time	: 98 Days
Method	: OECD Test Guideline 408

Reaction mass of (3R,4R)-1,1,1,2,2,3,4,5,5,5-decafluoropentane and (3S,4S)- 1,1,1,2,2,3,4,5,5,5-decafluoropentane

:

Species	: Rat, male and female
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NOAEL	:	15.463 mg/l
LOAEL	:	20.618 mg/l
Application Route	:	inhalation (vapour)
Exposure time	:	90 Days
Method	:	OECD Test Guideline 413

Aspiration toxicity

Not classified based on available information.

Components:

Reaction mass of (3R,4R)-1,1,1,2,2,3,4,5,5,5-decafluoropentane and (3S,4S)- 1,1,1,2,2,3,4,5,5,5-decafluoropentane

:

No aspiration toxicity classification

12. ECOLOGICAL INFORMATION

Ecotoxicity

Components:

Trans-Dichloroethylene:

Toxicity to fish	:	LC50 (Lepomis macrochirus (Bluegill sunfish)): 135 mg/l
		Exposure time: 96 h
		Remarks: Based on data from similar materials

Toxicity to daphnia and other aquatic invertebrates	:	EC50 (Daphnia magna (Water flea)): 220 mg/l
		Exposure time: 48 h
		Method: EPA-660/3-75-009

Toxicity to algae/aquatic plants	:	EbC50 (Pseudokirchneriella subcapitata (green algae)): 36.36 mg/l
		Exposure time: 48 h
		Method: OECD Test Guideline 201

Reaction mass of (3R,4R)-1,1,1,2,2,3,4,5,5,5-decafluoropentane and (3S,4S)- 1,1,1,2,2,3,4,5,5,5-decafluoropentane

:

Toxicity to fish	:	LC50 (Danio rerio (zebra fish)): 13 mg/l
		Exposure time: 96 h
		Method: OECD Test Guideline 203

Toxicity to daphnia and other aquatic invertebrates	:	EC50 (Daphnia magna (Water flea)): 10.6 mg/l
		Exposure time: 48 h
		Method: OECD Test Guideline 202

Toxicity to algae/aquatic plants	:	EC50 (Selenastrum capricornutum (green algae)): > 120 mg/l
		Exposure time: 72 h

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Method: OECD Test Guideline 201

NOEC (*Scenedesmus capricornutum* (fresh water algae)): 120 mg/l

Exposure time: 72 h

Method: OECD Test Guideline 201

Toxicity to daphnia and other aquatic invertebrates (Chronic toxicity) : NOEC (*Daphnia magna* (Water flea)): 1.72 mg/l
Exposure time: 21 d
Method: OECD Test Guideline 211

1,1,2,2,3,3,4-Heptafluorocyclopentane:

Toxicity to daphnia and other aquatic invertebrates : EC50 (*Daphnia magna* (Water flea)): 66.3 mg/l
Exposure time: 48 h
Method: OECD Test Guideline 202

Toxicity to algae/aquatic plants : ErC50 (*Pseudokirchneriella subcapitata* (green algae)): > 3.75 mg/l
Exposure time: 72 h
Method: OECD Test Guideline 201

NOEC (*Pseudokirchneriella subcapitata* (green algae)): 24.9 mg/l

Exposure time: 72 h

Method: OECD Test Guideline 201

Methanol:

Toxicity to fish : LC50 (*Lepomis macrochirus* (Bluegill sunfish)): 15,400 mg/l
Exposure time: 96 h

Toxicity to daphnia and other aquatic invertebrates : EC50 (*Daphnia magna* (Water flea)): > 10,000 mg/l
Exposure time: 48 h
Method: DIN 38412

Toxicity to algae/aquatic plants : ErC50 (*Raphidocelis subcapitata* (freshwater green alga)): 22,000 mg/l
Exposure time: 96 h
Method: OECD Test Guideline 201

Toxicity to microorganisms : EC50 (activated sludge): > 1,000 mg/l
Exposure time: 3 h
Test substance: Neutralised product
Method: OECD Test Guideline 209

Persistence and degradability

Components:

Trans-Dichloroethylene:

Biodegradability : Result: not rapidly degradable
Method: OECD Test Guideline 301D

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Reaction mass of (3R,4R)-1,1,1,2,2,3,4,5,5,5-decafluoropentane and (3S,4S)- 1,1,1,2,2,3,4,5,5,5-decafluoropentane

:

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

1,1,2,2,3,3,4-Heptafluorocyclopentane:

Biodegradability : Result: Not readily biodegradable.
Biodegradation: 0 %
Exposure time: 28 d
Method: OECD Test Guideline 301C

Methanol:

Biodegradability : Result: Readily biodegradable.
Biodegradation: 95 %
Exposure time: 20 d

Bioaccumulative potential

Components:

Trans-Dichloroethylene:

Partition coefficient: n-octanol/water : log Pow: 2.06

Reaction mass of (3R,4R)-1,1,1,2,2,3,4,5,5,5-decafluoropentane and (3S,4S)- 1,1,1,2,2,3,4,5,5,5-decafluoropentane

:

Bioaccumulation : Remarks: Bioaccumulation is unlikely.

Partition coefficient: n-octanol/water : log Pow: 2.4 (24 °C)

1,1,2,2,3,3,4-Heptafluorocyclopentane:

Partition coefficient: n-octanol/water : log Pow: 2.4

Methanol:

Bioaccumulation : Species: Leuciscus idus (Golden orfe)
Bioconcentration factor (BCF): < 10

Partition coefficient: n-octanol/water : log Pow: -0.77

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Mobility in soil

No data available

Other adverse effects

No data available

13. DISPOSAL CONSIDERATIONS

Disposal methods

Waste from residues	:	Do not dispose of waste into sewer.
		Dispose of in accordance with local regulations.
Contaminated packaging	:	Empty containers should be taken to an approved waste handling site for recycling or disposal.
		If not otherwise specified: Dispose of as unused product.

14. TRANSPORT INFORMATION

International Regulations

UNRTDG

UN number	:	Not applicable
Proper shipping name	:	Not applicable
Class	:	Not applicable
Subsidiary risk	:	Not applicable
Packing group	:	Not applicable
Labels	:	Not applicable
Environmentally hazardous	:	no

IATA-DGR

UN/ID No.	:	Not applicable
Proper shipping name	:	Not applicable
Class	:	Not applicable
Subsidiary risk	:	Not applicable
Packing group	:	Not applicable
Labels	:	Not applicable
Packing instruction (cargo aircraft)	:	Not applicable
Packing instruction (passenger aircraft)	:	Not applicable

IMDG-Code

UN number	:	Not applicable
Proper shipping name	:	Not applicable
Class	:	Not applicable
Subsidiary risk	:	Not applicable
Packing group	:	Not applicable
Labels	:	Not applicable
EmS Code	:	Not applicable
Marine pollutant	:	no

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Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code

Not applicable for product as supplied.

Special precautions for user

Not applicable

15. REGULATORY INFORMATION

National regulatory information

Regulations on Occupational Safety and Health Facilities	: applicable
Standards for the Storage, Cleanup, Handling and Disposal of Industrial Waste	: applicable
Regulations on Labelling and Hazard Communication of Hazardous Chemicals	: applicable
Rules on Road Traffic Safety	: Not applicable
Standards of Permissible Exposure Limits in Workplace	: applicable
Rules on the Prevention of Poisoning from Organic Solvents.	: applicable
Standard for the Control of Designated Hazardous and Dangerous Chemicals	: Not applicable
Establishment Standards and Safety Control Regulations for Manufacturing, Storing, Processing Public Hazardous Substances and Flammable Pressurized Gases Places	: Not applicable
Toxic and Concerned Chemical Substances Control Act	
Toxic chemical substances	: Not applicable
Concerned chemical substances	: Not applicable
Regulations for Governing Designating and Handling of Priority Management Chemicals	: applicable
Montreal Protocol	: Reaction mass of (3R,4R)-1,1,1,2,2,3,4,5,5,5-decafluoropentane and (3S,4S)-1,1,1,2,2,3,4,5,5,5-decafluoropentane

16. OTHER INFORMATION

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Further information

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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/>

Responsible Department : 130000033961
The Chemours (Taiwan) Company Limited
Product Sustainability Department
7F., No. 167, Dunhua N. Rd., Songshan Dist., Taipei City 105, Taiwan

Prepared by : 0080-112-7758
Zhenwen Tu / Product Stewardship and Regulatory Compliance Expert

Revision Date : 2025/03/05

Date format : yyyy/mm/dd

Full text of other abbreviations

ACGIH : USA. ACGIH Threshold Limit Values (TLV)
ACGIH BEI : ACGIH - Biological Exposure Indices (BEI)
TW OEL : Standards of Permissible Exposure Limits in Workplace
WEEL : Workplace Environmental Exposure Levels (WEEL)

ACGIH / TWA : 8-hour, time-weighted average
ACGIH / STEL : Short-term exposure limit
TW OEL / TWA : 8-hour time weighted average
TW OEL / STEL : time weighted average for short term exposure
WEEL / STEL : Short term exposure limit
WEEL / TWA : 8-hr TWA

AIIC - Australian Inventory of Industrial Chemicals; ANTT - National Agency for Transport by Land of Brazil; ASTM - American Society for the Testing of Materials; bw - Body weight; CMR - Carcinogen, Mutagen or Reproductive Toxicant; DIN - Standard of the German Institute for Standardisation; DSL - Domestic Substances List (Canada); 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; ERG - Emergency Response Guide; 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; Nch - Chilean Norm; NO(A)EC - No Observed (Adverse) Effect Concentration; NO(A)EL - No Observed (Adverse) Effect Level; NOELR - No Observable Effect Loading Rate; NOM - Official Mexican Norm; NTP - National Toxicology Program; NZIoC - New

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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; SADT - Self-Accelerating Decomposition Temperature; SDS - Safety Data Sheet; TCSI - Taiwan Chemical Substance Inventory; TDG - Transportation of Dangerous Goods; TECL - 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; WHMIS - Workplace Hazardous Materials Information System

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.

TW / EN