

**Solstice® 449A (R-449A)**

000000023760

Version 2.5

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**SECTION 1: Identification of the substance/mixture and of the company/undertaking****1.1. Product identifier**

Product name : Solstice® 449A (R-449A)  
SDS-number : 000000023760  
Type of product : Mixture  
Remarks : SDS according to Art. 31 of Regulation (EC) 1907/2006.

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

Use of the Substance/Mixture : Refrigerant

Uses advised against : none

**1.3. Details of the supplier of the safety data sheet**

Company : SOLSTICE ADVANCED MATERIALS IRELAND LIMITED  
1st Floor, Liffey Trust Centre,  
117-126 Sheriff Street Upper  
D01 YC43 Dublin  
Ireland  
Solstice Advanced Materials  
US, Inc.  
115 Tabor Road  
Morris Plains, NJ 07950-2546  
USA

Telephone : +353 1 447 9350  
For further information,  
please contact: : SafetyDataSheet@solstice.com

**1.4. Emergency telephone number**

Emergency telephone number : +1-703-527-3887 (ChemTrec-Transport)  
+1 303-739-1378 (Medical)  
: Poison Control Center:  
United Kingdom: (+44) 844 892 0111

**SECTION 2: Hazards identification****2.1. Classification of the substance or mixture****REGULATION (EC) No 1272/2008**

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Gases under pressure Liquefied gas  
 H280 Contains gas under pressure; may explode if heated.

**2.2. Label elements**
**REGULATION (EC) No 1272/2008**

Hazard pictograms



Signal word

: Warning

Hazard statements

: H280

Contains gas under pressure; may explode if heated.

Precautionary statements

: P410 + P403

Protect from sunlight. Store in a well-ventilated place.

Special labelling of certain products:

: Contains fluorinated greenhouse gases

**2.3. Other hazards**

Vapours are heavier than air and can cause suffocation by reducing oxygen available for breathing. Rapid evaporation of the liquid may cause frostbite. 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. 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.

**SECTION 3: Composition/information on ingredients**
**3.1. Substances**

Not applicable

**3.2. Mixtures**

| Chemical name | CAS-No.<br>Index-No.<br>EC-No. | Classification 1272/2008 | Concentration | Remarks |
|---------------|--------------------------------|--------------------------|---------------|---------|
|               |                                |                          |               |         |

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|                               |                       |   |        |  |
|-------------------------------|-----------------------|---|--------|--|
| Norflurane                    | 811-97-2<br>212-377-0 | Press. Gas ; H280                                       | 25,7 % |  |
| 2,3,3,3-Tetrafluoroprop-1-ene | 754-12-1<br>468-710-7 | Press. Gas Liquefied gas;<br>H280<br>Flam. Gas 1B; H221 | 25,3 % |  |
| Pentafluoroethane             | 354-33-6<br>206-557-8 | Press. Gas ; H280                                       | 24,7 % |  |
| Difluoromethane               | 75-10-5<br>200-839-4  | Flam. Gas 1B; H221<br>Press. Gas ; H280                 | 24,3 % |  |

Remaining components of this product are non-hazardous and/or are present at concentrations below reportable limits.

Occupational Exposure Limit(s), if available, are listed in Section 8.  
For the full text of the H-Statements mentioned in this Section, see Section 16.

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**SECTION 4: First aid measures**
**4.1 Description of first aid measures**
*General advice:*

First aider needs to protect himself. Move out of dangerous area. Take off all contaminated clothing immediately.

*Inhalation:*

Move to fresh air. If breathing is irregular or stopped, administer artificial respiration. Use oxygen as required, provided a qualified operator is present. Call a physician. Do not give drugs from adrenaline-ephedrine group.

*Skin contact:*

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After contact with skin, wash immediately with plenty of water. If there is evidence of frostbite, bathe (do not rub) with lukewarm (not hot) water. If water is not available, cover with a clean, soft cloth or similar covering. If symptoms persist, call a physician.

*Eye contact:*

Remove contact lenses. Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes.

*Ingestion:*

Unlikely route of exposure. As this product is a gas, refer to the inhalation section. Do not induce vomiting without medical advice. Call a physician immediately.

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

No data available

**4.3. Indication of any immediate medical attention and special treatment needed**

No data available

See Section 11 for more detailed information on health effects and symptoms.

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**SECTION 5: Firefighting measures****5.1. Extinguishing media***Suitable extinguishing media:*

The product is not flammable.

Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.

**5.2. Special hazards arising from the substance or mixture**

Contents under pressure.

This product is not flammable at ambient temperatures and atmospheric pressure.

However, this material can ignite when mixed with air under pressure and exposed to strong ignition sources.

Container may rupture on heating.

Cool closed containers exposed to fire with water spray.

Do not allow run-off from fire fighting to enter drains or water courses.

Vapours are heavier than air and can cause suffocation by reducing oxygen available for breathing.

Fire may cause evolution of:

Halogenated compounds

Hydrogen fluoride

Carbon oxides

Carbonyl halides

**5.3. Advice for firefighters**

In the event of fire and/or explosion do not breathe fumes.

Wear self-contained breathing apparatus and protective suit.

No unprotected exposed skin areas.

Use extinguishing measures that are appropriate to local circumstances and the surrounding environment. In the event of fire, cool tanks with water spray.

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**SECTION 6: Accidental release measures****6.1. Personal precautions, protective equipment and emergency procedures**

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Immediately evacuate personnel to safe areas. Keep people away from and upwind of spill/leak. Wear personal protective equipment. Unprotected persons must be kept away. Remove all sources of ignition. Avoid skin contact with leaking liquid (danger of frostbite). Ventilate the area. After release, disperses into the air. Vapours are heavier than air and can cause suffocation by reducing oxygen available for breathing. Ensure that the oxygen content is  $\geq 19.5\%$ .

**6.2. Environmental precautions**

Prevent further leakage or spillage if safe to do so. The product evaporates readily.

**6.3. Methods and materials for containment and cleaning up**

Ventilate the area.

**6.4. Reference to other sections**

For personal protection see section 8.

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**SECTION 7: Handling and storage****7.1. Precautions for safe handling***Advice on safe handling:*

Handle with care. Avoid inhalation of vapour or mist. Do not get in eyes, on skin, or on clothing. Wear personal protective equipment. Use only in well-ventilated areas. Pressurized container. Protect from sunlight and do not expose to temperatures exceeding 50 °C. Use authorized cylinders only. Do not pierce or burn, even after use. Do not spray on a naked flame or any incandescent material. Do not remove screw cap until immediately ready for use. Always replace cap after use.

*Advice on protection against fire and explosion:*

The product is not flammable. Can form a combustible mixture with air at pressures above atmospheric pressure.

*Hygiene measures:*

Handle in accordance with good industrial hygiene and safety practice. Ensure adequate ventilation, especially in confined areas. Avoid contact with skin, eyes and clothing. Remove and wash contaminated clothing before re-use. Keep working clothes separately.

**7.2. Conditions for safe storage, including any incompatibilities**

*Requirements for storage areas and containers:*

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Pressurized container: protect from sunlight and do not expose to temperatures exceeding 50 °C. Do not pierce or burn, even after use. Keep containers tightly closed in a dry, cool and well-ventilated place. Storage rooms must be properly ventilated. Ensure adequate ventilation, especially in confined areas.

**7.3. Specific end use(s)**

no additional data available

**SECTION 8: Exposure controls/personal protection****8.1. Control parameters****Occupational exposure limits:**

| Components                    | Basis / Value type | Value / Form of exposure | Exceeding Factor | Remarks  |
|-------------------------------|--------------------|--------------------------|------------------|--|
| Norflurane                    | HONEYWELL TWA      | 1.000 ppm                |                  |  |
| Norflurane                    | EH40 WEL TWA       | 4.240 mg/m3<br>1.000 ppm |                  |  |
| 2,3,3,3-Tetrafluoroprop-1-ene | WEEL TWA           | 500 ppm                  |                  |  |
| 2,3,3,3-Tetrafluoroprop-1-ene | HONEYWELL TWA      | 500 ppm                  |                  |  |
| Pentafluoroethane             | HONEYWELL TWA      | 1.000 ppm                |                  | We are not aware of any national exposure limit. |
| Difluoromethane               | HONEYWELL TWA      | 2.200 mg/m3<br>1.000 ppm |                  | We are not aware of any national exposure limit. |

HONEYWELL - Limit established by Solstice Advanced Materials  
TWA - Time weighted average

**DNEL/ PNEC-Values**

| Component  | End-use/impact      | Exposure duration | Value       | Exposure routes | Remarks |
|------------|---------------------|-------------------|-------------|-----------------|---------|
| Norflurane | Workers / Long-term |                   | 13936 mg/m3 | Inhalation      |         |

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|                               |  |  |              |            |  |
|-------------------------------|--|--|--------------|------------|--|
|                               | systemic effects                       |  |              |            |  |
| Norflurane                    | Consumers / Long-term systemic effects |  | 2476 mg/m3   | Inhalation |  |
| 2,3,3,3-Tetrafluoroprop-1-ene | Workers / Long-term systemic effects   |  | 950 mg/m3    | Inhalation |  |
| 2,3,3,3-Tetrafluoroprop-1-ene | Consumers / Long-term systemic effects |  | 113,1 mg/m3  | Inhalation |  |
| 2,3,3,3-Tetrafluoroprop-1-ene | Workers / Acute systemic effects       |  | 186400 mg/m3 | Inhalation |  |
| 2,3,3,3-Tetrafluoroprop-1-ene | Consumers / Acute systemic effects     |  | 186400 mg/m3 | Inhalation |  |
| Pentafluoroethane             | Workers / Long-term systemic effects   |  | 16444 mg/m3  | Inhalation |  |
| Pentafluoroethane             | Consumers / Long-term systemic effects |  | 1753 mg/m3   | Inhalation |  |
| Difluoromethane               | Workers / Long-term systemic effects   |  | 7035 mg/m3   | Inhalation |  |
| Difluoromethane               | Consumers / Long-term systemic effects |  | 750 mg/m3    | Inhalation |  |

| Component | Environmental compartment / Value | Remarks |
|-----------|-----------------------------------|---------|
|-----------|-----------------------------------|---------|

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|                               |                                      |                             |
|-------------------------------|--------------------------------------|-----------------------------|
| Norflurane                    | Fresh water: 0,1 mg/l                | Assessment factor:<br>1000  |
| Norflurane                    | Marine water: 0,01 mg/l              | Assessment factor:<br>10000 |
| Norflurane                    | Fresh water sediment: 0,75 mg/kg     | Assessment factor:<br>100   |
| Norflurane                    | Sewage treatment plant: 73 mg/l      | Assessment factor:<br>10    |
| 2,3,3,3-Tetrafluoroprop-1-ene | Fresh water: 0,1 mg/l                |                             |
| 2,3,3,3-Tetrafluoroprop-1-ene | Marine water: 0,01 mg/l              |                             |
| 2,3,3,3-Tetrafluoroprop-1-ene | Fresh water sediment: 1,51 mg/kg     |                             |
| 2,3,3,3-Tetrafluoroprop-1-ene | Marine sediment: 0,151 mg/kg         |                             |
| 2,3,3,3-Tetrafluoroprop-1-ene | Soil: 1,49 mg/kg                     |                             |
| Pentafluoroethane             | Fresh water: 0,1 mg/l                | Assessment factor:<br>1000  |
| Pentafluoroethane             | Fresh water sediment: 0,6 mg/kg dw   |                             |
| Difluoromethane               | Fresh water: 0,142 mg/l              | Assessment factor:<br>1000  |
| Difluoromethane               | Fresh water sediment: 0,534 mg/kg dw |                             |

## 8.2. Exposure controls

### Occupational exposure controls

The Personal Protective Equipment must be in accordance with EN standards:respirator EN 136, 140, 149; safety glasses EN 166; protective suit: EN 340, 463, 468, 943-1, 943-2; gloves EN 374, 511; safety shoes EN-ISO 20345.

### Personal protective equipment

#### *Respiratory protection:*

In case of insufficient ventilation wear suitable respiratory equipment.  
Self-contained breathing apparatus (EN 133)

#### *Hand protection:*

Protective gloves against cold  
(EN 511)

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Gloves must be inspected prior to use.  
Replace when worn.

*Eye protection:*

Safety glasses with side-shields conforming to EN166  
Face-shield

*Skin and body protection:*

Protective footwear

**Environmental exposure controls**

Handle in accordance with local environmental regulations and good industrial practices.

**SECTION 9: Physical and chemical properties****9.1. Information on basic physical and chemical properties**

- |                                     |   |                               |
|-------------------------------------|---|-------------------------------|
| (a) Physical state                  | : | gaseous                       |
| (b) Colour                          | : | clear<br>colourless           |
| (c) Odour                           | : | slight<br>ether-like          |
| (d) Melting point/freezing point    | : | No data available             |
| (e) Boiling point/boiling range     | : | No data available             |
| (g) Lower and upper explosion limit | : | Lower explosion limit<br>None |
|                                     | : | Upper explosion limit<br>None |
| (h) Flash point                     | : | Not applicable                |
| (i) Auto-ignition temperature       | : | No data available             |
| (j) Decomposition                   | : | 250 °C                        |

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temperature : To avoid thermal decomposition, do not overheat.

(k) pH : neutral

(l) Viscosity, kinematic : No data available

(m) Solubility(ies) : Water solubility:  
No data available

(n) Partition coefficient: n-octanol/water : No data available

(o) Vapour pressure : 1.142 kPa  
at 21,1 °C

(p) Density and / or relative density : 1,11 g/cm<sup>3</sup>

(q) Relative vapour density : No data available  
(Air = 1.0)

(r) Particle characteristics : No data available

**9.2 Other Information**

Polymer characteristics : No data available

Evaporation rate : No data available

Viscosity, dynamic : No data available

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**SECTION 10: Stability and reactivity****10.1. Reactivity**

Stable under normal conditions.

**10.2. Chemical stability**

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&gt;250 °C

To avoid thermal decomposition, do not overheat.

**10.3. Possibility of hazardous reactions**

Hazardous polymerisation does not occur.

**10.4. Conditions to avoid**

Pressurized container. Protect from sunlight and do not expose to temperatures exceeding 50 °C.

Some risk may be expected of corrosive and toxic decomposition products.

Can form a combustible mixture with air at pressures above atmospheric pressure.

Do not mix with oxygen or air above atmospheric pressure.

**10.5. Incompatible materials**

Potassium

Calcium

Powdered metals

Finely divided aluminium

Finely divided magnesium

Zinc

**10.6. Hazardous decomposition products**

Halogenated compounds

Hydrogen fluoride

Carbonyl halides

Carbon oxides

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**SECTION 11: Toxicological information****11.1. Information on hazard classes as defined in Regulation (EC) No 1272/2008****(a) Acute toxicity***Acute oral toxicity:*

Not applicable

*Acute dermal toxicity:*

No data available

*Acute inhalation toxicity:*

LC50

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Species: Rat  
Value: > 400000 ppm  
Exposure time: 4 h  
Method: OECD Test Guideline 403  
Test substance: 2,3,3,3-Tetrafluoroprop-1-ene

LC50  
Species: Rat  
Value: > 500000 ppm  
Exposure time: 4 h  
Test substance: 1,1,1,2-tetrafluoroethane (HFC-134a)

LC0  
Species: Rat  
Value: > 520000 ppm  
Exposure time: 4 h  
Method: OECD Test Guideline 403  
Test substance: Ethane, pentafluoro- (HFC-125)

Species: Rat  
Value: > 769000 ppm  
Exposure time: 4 h  
Test substance: Ethane, pentafluoro- (HFC-125)

*Acute toxicity (other routes of administration):*  
No data available

**(b) Skin corrosion/irritation:**  
No data available

**(c) Serious eye damage/eye irritation:**  
No data available

**(d) Respiratory or skin sensitisation:**  
No data available

**(e) Germ cell mutagenicity:**  
Test Method: Ames test  
Result: negative  
Test substance: Pentafluoroethane

Test Method: Ames test  
Result: negative

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Test substance: Difluoromethane (HFC-32)

Test Method: Chromosome aberration test in vitro

Cell type: Human lymphocytes

Result: negative

Method: OECD Test Guideline 473

Test substance: Difluoromethane (HFC-32)

Test Method: Ames test

Result: 20% and higher, positive in TA 100 and e. coli WP2 uvrA, negative in TA98, TA100, and TA1535.

Method: OECD Test Guideline 471

Test substance: 2,3,3,3-Tetrafluoroprop-1-ene

**(f) Carcinogenicity:**

Species: Rat

Test substance: 2,3,3,3-Tetrafluoroprop-1-ene

Note: Not classified as a human carcinogen. Substance not expected to be a carcinogen based on available data.

:

Test substance: 1,1,1,2-tetrafluoroethane (HFC-134a)

Note: Not classified as a human carcinogen. Substance not expected to be a carcinogen based on available data.

**(h) STOT-single exposure:**

No data available

**(i) STOT - repeated exposure:**

Species: Rat

Application Route: Inhalation

Exposure time: 90 d

NOEL: 50000

Test substance: Ethane, pentafluoro- (HFC-125)

Note: Subchronic toxicity

Species: Rat

NOEL: 40000

Test substance: 1,1,1,2-tetrafluoroethane (HFC-134a)

Species: Rat

Application Route: Inhalation

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Exposure time: 4 Weeks

NOEL: 50000

Test substance: Ethane, pentafluoro- (HFC-125)

Note: Subchronic toxicity

Species: Rat

Application Route: Inhalation (whole body)

Exposure time: 28 d

NOAEL: 49500 ppm

Method: OECD Test Guideline 412

Note: Subacute toxicity

Species: Rat

Application Route: Inhalation

Exposure time: 2 Weeks

NOEL: 50000

Test substance: 2,3,3,3-Tetrafluoroprop-1-ene

Method: OECD Test Guideline 412

Species: Rat

Application Route: Inhalation

Exposure time: 4 Weeks

NOAEL: 50000 ppm

Test substance: 2,3,3,3-Tetrafluoroprop-1-ene

Method: OECD Test Guideline 412

Species: Rat

Application Route: Inhalation

Exposure time: 13 Weeks

NOAEL: 50000 ppm

Test substance: 2,3,3,3-Tetrafluoroprop-1-ene

Method: OECD Test Guideline 413

Species: Rabbit, male

Application Route: Inhalation

Exposure time: 28 d

NOEL: 500

Test substance: 2,3,3,3-Tetrafluoroprop-1-ene

Method: OECD Test Guideline 412

Note: There are no observed toxicological effects, which result in classification as a specific target organ toxicant.

Species: Rabbit, female

Application Route: Inhalation

Exposure time: 28 d

NOEL: 1000

Test substance: 2,3,3,3-Tetrafluoroprop-1-ene

Method: OECD Test Guideline 412

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Note: There are no observed toxicological effects, which result in classification as a specific target organ toxicant.

Species: Mini-pig  
Application Route: Inhalation  
Exposure time: 28 d  
NOAEL: 10000 ppm  
Test substance: 2,3,3,3-Tetrafluoroprop-1-ene  
Note: highest exposure tested

**(j) Aspiration hazard:**

No data available

**11.2. Information on other hazards***Endocrine disrupting properties*

No data available

*Other information:*

No data available

**SECTION 12: Ecological information****12.1. Toxicity***Toxicity to fish:*

LC50

Species: Cyprinus carpio (Carp)

Value: &gt; 197 mg/l

Exposure time: 96 h

Method: OECD Test Guideline 203

Test substance: 2,3,3,3-Tetrafluoroprop-1-ene

No demonstrable toxic effect in saturated solution.

LC50

semi-static test

Species: Oncorhynchus mykiss (rainbow trout)

Value: 450 mg/l

Exposure time: 96 h

Method: 92/69/EEC, C.1

Test substance: 1,1,1,2-tetrafluoroethane (HFC-134a)

*Toxicity to aquatic plants:*

EC50

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Growth rate  
Species: Algae  
Value: 142 mg/l  
Exposure time: 96 h  
Test substance: Difluoromethane (HFC-32)

Growth rate  
Species: Selenastrum capricornutum (green algae)  
Value: > 118 mg/l  
Exposure time: 72 h  
Method: OECD Test Guideline 201  
Test substance: 1,1,1,2-tetrafluoroethane (HFC-134a)

EC50  
Biomass  
Species: Selenastrum capricornutum (green algae)  
Value: > 118 mg/l  
Exposure time: 72 h  
Method: OECD Test Guideline 201  
Test substance: REACH dossier "read-across"

EC50  
Growth rate  
Species: Selenastrum capricornutum (green algae)  
Value: > 118 mg/l  
Exposure time: 72 h  
Method: OECD Test Guideline 201  
Test substance: REACH dossier "read-across"

EC50  
Species: Scenedesmus capricornutum (fresh water algae)  
Value: > 100 mg/l  
Method: OECD Test Guideline 201  
Test substance: 2,3,3,3-Tetrafluoroprop-1-ene

EC50  
Biomass  
Species: Selenastrum capricornutum (green algae)  
Value: > 114 mg/l  
Exposure time: 72 h  
Method: OECD Test Guideline 201  
Test substance: REACH dossier "read-across"

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## EC50

Growth rate

Species: *Selenastrum capricornutum* (green algae)

Value: &gt; 114 mg/l

Exposure time: 72 h

Method: OECD Test Guideline 201

Test substance: REACH dossier "read-across"

## NOEC

Biomass

Species: *Selenastrum capricornutum* (green algae)

Value: 13,2 mg/l

Exposure time: 72 h

Method: OECD Test Guideline 201

Test substance: REACH dossier "read-across"

## NOEC

Growth rate

Species: *Selenastrum capricornutum* (green algae)

Value: 13,2 mg/l

Exposure time: 72 h

Method: OECD Test Guideline 201

Test substance: REACH dossier "read-across"

*Toxicity to Microorganisms:*

## EC10

Growth inhibition

Species: *Pseudomonas putida*

Value: &gt; 730 mg/l

Exposure time: 6 h

Test substance: 1,1,1,2-tetrafluoroethane (HFC-134a)

*Toxicity to aquatic invertebrates:*

## EC50

Species: *Daphnia* sp. (Crustacea)

Value: 652 mg/l

Exposure time: 48 h

Test substance: Difluoromethane (HFC-32)

## EC50

Species: *Daphnia magna* (Water flea)

Value: &gt; 83 mg/l

Exposure time: 48 h

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Method: OECD Test Guideline 202  
Test substance: 2,3,3,3-Tetrafluoroprop-1-ene  
EC50  
static test  
Species: Daphnia magna (Water flea)  
Value: 980 mg/l  
Exposure time: 48 h  
Method: EEC 92/69/V, C2  
Test substance: 1,1,1,2-tetrafluoroethane (HFC-134a)  
EC50  
Immobilization  
Species: Daphnia magna (Water flea)  
Value: > 97,9 mg/l  
Exposure time: 48 h  
Method: OECD Test Guideline 202  
Test substance: REACH dossier "read-across"

**12.2. Persistence and degradability***Biodegradability:*

Biodegradation: 5 %  
Exposure time: 28 d  
Method: OECD 301 D  
Test substance: Difluoromethane (HFC-32)

*Biodegradability:*

Biodegradation: 5 %  
Result: Not readily biodegradable.  
Method: OECD 301 D  
Test substance: Ethane, pentafluoro- (HFC-125)

*Biodegradability:*

Result: Not readily biodegradable.  
Method: OECD Test Guideline 301F  
Test substance: 2,3,3,3-Tetrafluoroprop-1-ene

*Biodegradability:*

Biodegradation: 3 %  
Exposure time: 28 d  
Result: Not rapidly biodegradable  
Method: OECD 301 D  
Test substance: 1,1,1,2-tetrafluoroethane (HFC-134a)

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**12.3. Bioaccumulative potential**

No data available

**12.4. Mobility in soil**

No data available

**12.5. Results of PBT and vPvB assessment**

Product does not contain substances which are persistent, bioaccumulative, and toxic (PBT) at levels of 0.1% or higher.

Product does not contain substances which are very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

**12.6. Endocrine disrupting properties**

No data available

**12.7. Other adverse effects**

Accumulation in aquatic organisms is unlikely.

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**SECTION 13: Disposal considerations****13.1. Waste treatment methods***Product:*

Dispose according to legal requirements.

*Packaging:*

Legal requirements are to be considered in regard of reuse or disposal of used packaging materials

*Further information:*

Provisions relating to waste:

EC Directive 2006/12/EC; 2008/98/EEC

Regulation No. 1013/2006

For personal protection see section 8.

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**SECTION 14: Transport information****14.1 UN number or ID number**

ADR/RID:3163

IMDG:3163

IATA:3163

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**14.2 UN proper shipping name**

ADR/RID: LIQUEFIED GAS, N.O.S. (1,1,1,2-TETRAFLUOROETHANE, R-1234yf, PENTAFLUOROETHANE)

IMDG: LIQUEFIED GAS, N.O.S. (1,1,1,2-TETRAFLUOROETHANE, R-1234yf, PENTAFLUOROETHANE)

IATA: Liquefied gas, n.o.s. (1,1,1,2-Tetrafluoroethane, R-1234yf, Pentafluoroethane)

**14.3 Transport hazard class(es)**

ADR/RID: 2.2

IMDG: 2.2

IATA: 2.2

**14.4 Packaging group**

No data available

**14.5 Environmental hazards**

ADR/RID: no

Marine pollutant: no

**14.6 Special precautions for user**

IMDG Code segregation group according chapter 3.1.4.4 : NONE,

**14.7 Maritime transport in bulk according to IMO instruments**

No data available

**SECTION 15: Regulatory information****15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture***Global warming potential :*  
1.397**Other inventory information**

USA. List of Active Substances on the Toxic Substances Control Act (TSCA) Chemical Substances Inventory, as amended

All substances listed as active on the TSCA inventory

Australian Inventory of Industrial Chemicals

All components are listed on the inventory, regulatory obligations/restrictions apply

Canada. Domestic Substances List (DSL), as amended

All components of this product are on the Canadian DSL

Japan. Kashin-Hou Law List

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On the inventory, or in compliance with the inventory

Korea. Existing Chemicals Inventory (KECI)

On the inventory, or in compliance with the inventory

Philippines. Inventory of Chemicals and Chemical Substances (PICCS)

On the inventory, or in compliance with the inventory

China. Inventory of Existing Chemical Substances (IECSC)

On the inventory, or in compliance with the inventory

Thailand. Existing Chemicals Inventory from FDA (TECI List)

On the inventory, or in compliance with the inventory

Taiwan Chemical Substance Inventory (TCSI)

On the inventory, or in compliance with the inventory

**15.2 Chemical safety assessment**

A Chemical Safety Assessment has not been carried out.

**SECTION 16: Other information****Text of H-statements referred to under heading 3**

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

2,3,3,3-Tetrafluoroprop-1-ene : H280 Contains gas under pressure; may explode if heated.  
H221 Flammable gas.

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

Difluoromethane : H221 Flammable gas.  
H280 Contains gas under pressure; may explode if heated.

**Further information**

All directives and regulations refer to amended versions.

Vertical lines in the left hand margin indicate a relevant amendment from the previous version.

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## Abbreviations:

EC European Community

CAS Chemical Abstracts Service

DNEL Derived no effect level

PNEC Predicted no effect level

vPvB Very persistent and very bioaccumulative substance

PBT Persistent, bioaccumulative und toxic substance

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