

Genetron® 134a (R-134a)

000000009876

Version 3.8

Revision Date 06.11.2025

Supersedes 2

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

Product name : Genetron® 134a (R-134a)
SDS-number : 000000009876
Type of product : Substance
Remarks : SDS according to Art. 31 of Regulation (EC) 1907/2006.

Chemical name : Norflurane
CAS-No. : 811-97-2

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

Use of the Substance/Mixture : Refrigerant
Propellant
Heat transfer fluid
Foam blowing agent

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:

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United Kingdom: (+44) 844 892 0111

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

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	:	P280	Wear protective gloves/ eye protection/ face protection.
		P284	In case of inadequate ventilation wear respiratory protection.
		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. 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.

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

Chemical name	CAS-No. Index-No. EC-No.	Classification 1272/2008	Concentration	Remarks
Norflurane	811-97-2 212-377-0	Press. Gas ; H280	99,8 %	

3.2. Mixtures

Not applicable

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.

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.

Inhalation:

Remove to fresh air. Artificial respiration and/or oxygen may be necessary. Call a physician immediately.

Skin contact:

Rapid evaporation of the liquid may cause frostbite. In case of contact with liquid, thaw frosted parts with water, then remove clothing carefully. Wash with plenty of water. Consult a physician. Take off contaminated clothing and shoes immediately. Wash contaminated clothing before re-use.

Eye contact:

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

Ingestion:

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As this product is a gas, refer to the inhalation section. Ingestion is unlikely because of the physical properties and is not expected to be hazardous.

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

Do not give adrenaline or similar drugs.

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

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.

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

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5.3. Advice for firefighters

Wear full protective clothing and self-contained breathing apparatus.
Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.

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

Immediately contact emergency personnel. Wear personal protective equipment. Unprotected persons must be kept away. Ensure adequate ventilation. In case of insufficient ventilation wear suitable respiratory equipment.

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.

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

Open drum carefully as content may be under pressure. The product should only be used in areas from which all naked lights and other sources of ignition have been excluded. Pressurized container. Protect from sunlight and do not expose to temperatures exceeding 50 °C. Do not pierce or burn, even after use. Do not spray on a naked flame or any incandescent material. Do not use in areas without adequate ventilation. Contaminated equipment (brushes, rags) must be cleaned immediately with water.

Hygiene measures:

Provide adequate ventilation. When using do not eat or drink.

7.2. Conditions for safe storage, including any incompatibilities

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Further information on storage conditions:

Store in original container. Keep away from direct sunlight. Keep containers tightly closed in a cool, well-ventilated place.

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 1.000 ppm		

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 systemic effects		13936 mg/m3	Inhalation	
Norflurane	Consumers / Long-term systemic effects		2476 mg/m3	Inhalation	

Component	Environmental compartment / Value	Remarks

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Norflurane	Fresh water: 0,1 mg/l	Assessment factor: 1000
Norflurane	Marine water: 0,01 mg/l	Assessment factor: 10000
Norflurane	Fresh water sediment: 0,75 mg/kg	Assessment factor: 100
Norflurane	Sewage treatment plant: 73 mg/l	Assessment factor: 10

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:

Glove material: Viton®

Break through time: > 480 min

Glove thickness: 0,7 mm

Vitoject® 890

Protective gloves against cold
(EN 511)

Gloves must be inspected prior to use.

Replace when worn.

Remarks:Supplementary note: The specifications are based on information and tests from similar substances by analogy.

Due to varying conditions (e.g.temperature or other strains) it must be considered that the usage of a chemical protective glove in practice may be much shorter than the permeation time determined in accordance with EN 374.

Since actual conditions of practical use often deviate from standardised conditions according EN 374 the glove manufacturer recommends to use the chemical protective glove in practice not longer than 50% of the recommended permeation time.

Manufacturer´s directions for use should be observed because of great diversity of types .

Suitable gloves tested according EN 374 are supplied e.g. from KCL GmbH, D-36124 Eichenzell, Vertrieb@kcl.de

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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 : colourless
- (c) Odour : weak
- (d) Melting point/freezing point : -101 °C
- (e) Boiling point/boiling range : -26,2 °C
- (f) Flammability : No data available
- (g) Lower and upper explosion limit : Lower explosion limit
No data available
- : Upper explosion limit
No data available
- (h) Flash point : Not applicable
- (i) Auto-ignition temperature : >750 °C
- (j) Decomposition temperature : 250 °C

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- (k) pH : neutral
- (l) Viscosity, kinematic : No data available
- (m) Solubility(ies) : Water solubility:
1,5 g/l
- (n) Partition coefficient: n-
octanol/water : log Pow 1,06
The product is more soluble in octanol.
- (o) Vapour pressure : 5.915 hPa
at 21,1 °C

14.713 hPa
at 54,4 °C
- (p) Density and / or relative
density : 1,2 g/cm³
- (q) Relative vapour density : 3,5
- (r) Particle characteristics : No data available

9.2 Other Information

- Polymer characteristics : No data available
- Evaporation rate : > 1
Method: Compared to CCl₄.
- Viscosity, dynamic : No data available

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

Stable under normal conditions.

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Hazardous polymerisation does not occur.

10.2. Chemical stability

No data available

10.3. Possibility of hazardous reactions

No data available

10.4. Conditions to avoid

Heating will cause pressure rise with risk of bursting
Pressurized container. Protect from sunlight and do not expose to temperatures exceeding 50 °C.
Do not pierce or burn, even after use. Do not spray on a naked flame or any incandescent material.

10.5. Incompatible materials

oxidising substances
Possible incompatibility with alkali sensitive materials.
Powdered metals

10.6. Hazardous decomposition products

Halogenated compounds
Hydrogen fluoride
Carbonyl halides
Carbon oxides

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
Species: Rat

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Value: > 500000 ppm
Exposure time: 4 h

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
Method: OECD Test Guideline 471

Species: Mouse
Result: negative

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

(g) Reproductive toxicity:
Species: Mouse
Route of Application: Inhalation
General Toxicity - Parent: NOEL: 50.000 ppm
Method: OECD Test Guideline 414
Species: Rabbit
Route of Application: Inhalation
General Toxicity Maternal: NOEL: 2.500 ppm
Embryo-foetal toxicity: NOEL: 40.000 ppm

(h) STOT-single exposure:
No data available

(i) STOT - repeated exposure:
No data available

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(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

semi-static test

Species: *Oncorhynchus mykiss* (rainbow trout)

Value: 450 mg/l

Exposure time: 96 h

Method: 92/69/EEC, C.1

Toxicity to aquatic plants:

Growth rate

Species: *Selenastrum capricornutum* (green algae)

Value: > 118 mg/l

Exposure time: 72 h

Method: OECD Test Guideline 201

Toxicity to Microorganisms:

EC10

Growth inhibition

Species: *Pseudomonas putida*

Value: > 730 mg/l

Exposure time: 6 h

Toxicity to aquatic invertebrates:

EC50

static test

Species: *Daphnia magna* (Water flea)

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Value: 980 mg/l
Exposure time: 48 h
Method: EEC 92/69/V, C2

12.2. Persistence and degradability*Biodegradability:*

Biodegradation: 3 %
Exposure time: 28 d
Result: Not rapidly biodegradable
Method: OECD 301 D

12.3. Bioaccumulative potential

No data available

12.4. Mobility in soil

No data available

12.5. Results of PBT and vPvB assessment

Not persistent, bioaccumulative, and toxic (PBT).
Not very persistent and very bioaccumulative (vPvB).

12.6. Endocrine disrupting properties

No data available

12.7. Other adverse effects

Accumulation in aquatic organisms is unlikely.

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

Offer surplus and non-recyclable solutions to a licensed disposal company. Refer to manufacturer/supplier for information on recovery/recycling. Classification: 14.06.01

Further information:

Provisions relating to waste:
EC Directive 2006/12/EC; 2008/98/EEC
Regulation No. 1013/2006

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For personal protection see section 8.

SECTION 14: Transport information
14.1 UN number or ID number

ADR/RID:3159

IMDG:3159

IATA:3159

14.2 UN proper shipping name

ADR/RID:1,1,1,2-TETRAFLUOROETHANE

IMDG:1,1,1,2-TETRAFLUOROETHANE

IATA:1,1,1,2-Tetrafluoroethane

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

Basis	Value	Remarks
Substances of very high concern (SVHC)		This product does not contain substances of very high concern according to Regulation (EC) No Article 57 above the respective regulatory 1907/2006 (REACH), concentration limit of ≥ 0.1 % (w/w).

Global warming potential :

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1.430

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

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 been carried out. In accordance to the article 14(4) of the REACH regulation (EC) No. 1907/2006, exposure estimation and risk characterization is not required.

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

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Norflurane : 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.

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

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 given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text. Final determination of suitability of any material is the sole responsibility of the user.

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