



IGAS USA, INC.

8105 ANDERSON RD TAMPA, FL 33634, UNITED STATES
OF AMERICA

Safety Data Sheet

Revision date: 5/5/2023

Trade name: R-134a

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

1.1 Product identifier

Trade name: R-134a
Substance name: Norflurane
REACH Reg. No.: The substance has been pre-registered. The transition time according to REACH Regulation, Article 23 is still not expired.
Pre-reg. No.: 17-2119445507-36-0000
CAS No.: 811-97-2
EC No.: 212-377-0

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

Identified uses: Used as refrigerants.
Uses advised against: No uses advised against.

1.3 Details of the supplier of the SDS

Only Representative: REACH COMPLIANCE SERVICES LIMITED
Address: 306 The Capel Building, Mary's Abbey, Dublin 7, Ireland
E-mail: Info@reach24h.com

Manufacturer: ZHEJIANG QUHUA FLUOR-CHEMISTRY CO.LTD.
Address: QUZHOU ZHEJIANG, CHINA
E-mail: ihw@iuhua.com.cn
Telephone: +86 570 3617661
Fax: +86 570 3090106

Importer:
Address:
E-mail:
Telephone:
Fax:

1.4 Emergency telephone number

+86 570 3617661 (China)

Section 2: Hazards identification

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2.1 Classification of the substance or mixture

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

Gases under pressure (Liquefied gases); H280

Classification according to Council Directive 67/548/EEC [DSD]

This product does not meet the criteria for classification in any hazard class according to Directive 67/548/EEC on classification, labelling and packaging of substances.

Additional information

Full text of H-statement(s): see section 16.

2.2 Label elements

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

Substance name: Norflurane

Hazard pictogram(s):



GHS04

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.

Supplemental Hazard information (EUH):

No information available.

Special rules for supplemental label elements for certain mixtures:

No information available.

2.3 Other hazards

Fluorinated greenhouse gases, which has climatic warming potential.

Section 3: Composition/information on ingredients

3.1 Substance information

Substance name	Synonym	CAS No.	EC No.	Molecular formula	Classification according to DSD	% (w/w)
Norflurane	HFC134a, KLEA134A	811-97-2	212-377-0	C2H2F4	No classification.	≥99.9

Substance name	Synonym	CAS No.	EC No.	Molecular formula	Classification according to CLP	% (w/w)
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Norflurane	HFC134a, KLEA134A	811-97-2	212-377-0	C2H2F4	Press. Gas (Liq. gas); H280	≥99.9
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Remark: The rest unspecified ingredients are impurities, and they are not hazard.

Full text of H-statement(s): see section 16.

Section 4: First aid measures

4.1 Description of first aid measures

General notes: In all cases of doubt, or when symptoms persist, seek medical attention.

Following inhalation:

Remove victim to fresh air. Keep warm and at rest.

If not breathing, give artificial respiration, preferably mouth-to-mouth.

If breathing is labored, give oxygen. In the event of a cardiac arrest, apply external cardiac massage.

Following skin contact:

Thaw affected area with water. Remove contaminated clothing.

Caution: clothing may adhere to the skin in case of freeze burns.

After contact with skin, wash immediately with plenty of warm water.

If symptoms (irritation or blistering) develop, get medical attention.

Following eye contact:

Immediately flush with plenty of water.

After initial flushing, remove any contact lenses and continue flushing for at least 15 minutes.

Have eyes examined and treated by medical personnel.

Following ingestion:

Notes for the doctor:

Do not administer adrenaline or similar sympathomimetic drugs as cardiac arrhythmias may result.

Treatment of overexposure should be directed at the control of symptoms and the clinical conditions.

4.2 Most important symptoms and effects, both acute and delayed

Potential Health Effects:

General: The health hazard assessment is based on toxicity studies together with information from a search of the scientific literature and other commercial sources.

Ingestion: Extremely unlikely to occur in use.

Eye contact: Liquid splashes or vapor spray may cause freeze burns.

Skin contact: The liquid form of this product may cause freeze burns (frostbite-like lesions).

Skin absorption: This product will probably not be absorbed through human skin.

Inhalation: Exposure to very high vapor concentrations can induce anesthetic effects progressing from dizziness, weakness, nausea, to unconsciousness. It can act as an asphyxiant by limiting available oxygen. Very high doses can cause abnormal heart rhythm which is potentially fatal.



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4.3 Indication of the immediate medical attention and special treatment needed

Persons with pre-existing skin, eye, or respiratory disease may be at increased risk from the irritant or allergic properties of this material. Attending physician should treat exposed patients symptomatically.

Section 5: Fire-fighting measures

5.1 Extinguishing media

Suitable extinguishing media:

In case of fire in the surroundings: use appropriate extinguishing media.

Unsuitable extinguishing media:

For this substance/mixture no limitations of extinguishing agents are given.

5.2 Special hazards arising from the substance or mixture

Heavy vapors can suffocate.

HFC134a is not flammable in air under ambient conditions of temperature and pressure.

Under conditions of high temperature and pressure, certain HFC134a/air mixtures were shown to be flammable.

Mixtures of HFC134a and air or oxygen should not be used for pressure or leak testing.

Certain mixtures of HFC134a and chlorine may be flammable under some conditions.

Thermal decomposition will evolve toxic and irritant vapors.

5.3 Advice for fire-fighters

Shut off gas supply if this can be done safely. If possible, take container out of dangerous zone.

Cool cylinders with water spray. Self-contained breathing apparatus (SCBA) may be required if cylinders rupture or release under fire conditions.

Section 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

Immediately contact emergency personnel. Keep unnecessary personnel away.

Use suitable protective equipment (section 8). Shut off gas supply if this can be done safely.

Isolate area until gas has dispersed.

6.2 Environmental precautions

Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

Discharge into the environment must be avoided.

6.3 Methods and material for containment and cleaning up

For large releases: Use recommended personal protection and evacuate unprotected personnel.



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Shut off the leak if without risk. Ventilate the spill area. If possible, dike and contain spillage.

Prevent liquid from entering sewers, sumps or pit areas since vapor can create a suffocating atmosphere. Capture material for recycle or destruction if suitable equipment is available.

6.4 Reference to other sections

See Section 7 for information on safe handling.

See section 8 for information on personal protection equipment.

See Section 13 for information on disposal.

Section 7: Handling and storage

7.1 Precautions for safe handling

Avoid causing and inhaling high concentrations of vapor.

Atmospheric levels should be controlled to below the occupational exposure limit and kept as low as practicable. Do not put mixture of HFC134a with air or oxygen under pressure.

Do not use such mixtures for leak or pressure testing.

Avoid HFC134a contact with flame or very hot surfaces.

7.2 Conditions for safe storage, including any incompatibilities

Keep at temperature not exceeding 120 °F (49 °C).

Keep in a cool, well ventilated place. Keep containers dry.

Keep away from direct sunlight, heat and sources of ignition.

7.3 Specific end use(s)

Apart from the uses mentioned in section 1.2 no other specific uses are stipulated.

Section 8 : Exposure controls/personal protection

8.1 Control parameters

Occupational exposure limit values:

CAS # 811-97-2 Country of origin	Occupational exposure limit values			
	Long term/ Eight hours		Short term	
Austria	1000 ppm	4200 mg/m ³	4000 ppm	16800 mg/m ³
Germany (AGS)	1000 ppm	4200 mg/m ³	8000 ppm	33600 mg/m ³
Germany (DFG)	1000 ppm	4200 mg/m ³	8000 ppm	33600 mg/m ³
Sweden	500 ppm	2000 mg/m ³	750 ppm	3000 mg/m ³
Switzerland	1000 ppm	4200 mg/m ³	-	-
United Kingdom	1000 ppm	4240 mg/m ³	-	-

Workplace Environmental Exposure Level (WEEL): 8-hr Time-weighted Average (TWA) 1000 ppm.



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8.2 Exposure controls

Appropriate engineering controls:

Use adequate general or local exhaust ventilation to keep airborne concentrations below the permissible exposure limits.

Personal protective equipment:

Eye and face protection: Chemical tight goggles; full faceshield in addition if splashing is possible.

Skin protection: Body protection:

Impervious gloves if any possibility of skin contact with liquid. Additional protection may be required such as apron, arm covers, or full body suit, depending upon conditions.

Hand protection:

Wear leather gloves to prevent frostbite injuries from rapidly expanding gas when handling pressurised gas bottles.

Respiratory protection: Not normally needed if controls are adequate. If needed, use MSHA-NIOSH approved respirator for organic vapors. For high concentrations and oxygen-deficient atmospheres, use positive pressure air-supplied respirator.

Environmental exposure controls:

Do not allow material to be released to the environment without the proper governmental permits.

Industrial hygiene:

Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday. Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.

Section 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

Appearance:	Compressed liquefied gas.
Colour:	Clear, colorless
Odour:	Faint ethereal odor
pH:	No data available.
Melting point:	-101°C
Boiling point:	-26.2°C
Specific gravity:	1.23 at 20°C (70°F)
Relative Vapor Density:	3.3 (air = 1)
Vapour pressure:	4268 mmHg at 20°C (70°F)
Partition coefficient (n -octanol/water):	Log pow = 1.274 (HSDB)
Solubility in water:	Slightly in water.
Flash point:	No data available.
Critical Temperature:	101.1°C(214°F)



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Critical Pressure:	4.05 Mpa
Flammability:	Not flammable.
Decomposition temperature:	No data available.
Explosive properties:	No data available.
Oxidising properties:	Non oxidizer.
Evaporation rate :	No data available.
Viscosity:	No data available.
Volatile:	100 WT%

9.2 Other information

No data available.

Section 10: Stability and reactivity

10.1 Reactivity

On contact with hot surfaces or flames this substance decomposes forming toxic and corrosive fumes.

10.2 Chemical stability

Stable under normal temperature conditions and recommended use.

10.3 Possibility of hazardous reactions

Can react violently if in contact with alkali or alkali earth metals such as sodium, potassium or barium.

Dangerous on contact with acid or acid fumes, they emit highly toxic fumes.

10.4 Conditions to avoid

Avoid open flames and high temperatures.

10.5 Incompatible materials

Finely divided metals, magnesium and alloys containing more than 2% magnesium.

Strong oxidizing agents, Alkali metals.

10.6 Hazardous decomposition products

On contact with hot surfaces or flames this substance decomposes forming toxic and corrosive fumes.

Hazardous decomposition products formed under fire conditions. - Carbon oxides, Hydrogen fluoride

Section 11: Toxicological information

11.1 Toxicokinetics, metabolism and distribution

The metabolism of R-134a by hepatocytes was investigated. Liver cells were isolated from male Fischer 344 rats and exposed to atmospheres containing R-134a and/or halothane and analyzed for fluoride. Fluoride was detected after exposure of hepatocytes to 25% R-134a, and the amount increased with the number of cells and with increasing



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R-134a concentration. A nonlinear relationship was seen between R-134a concentration and fluoride, indicating probable substrate saturation. When hepatocytes were incubated with 25% R-134a and halothane, there was a reduction in fluoride production that was related to the concentration of halothane. Hepatocytes from phenobarbital treated animals produced as much fluoride as untreated animals in the presence of 12.5% or less R-134a, however at a concentration of 25% or more R-134a, phenobarbital treated cells produced more fluoride than untreated cells. It was concluded that R-134a can be metabolized by liver cells, and may involve cytochrome p450. (HSDB)

11.2 Information on toxicological effects

Acute toxicity:

Acute Inhalation toxicity: $LC_{50} = 1700 \text{ mg/m}^3/2\text{h}$ (mouse) (NLM Dataset);

$LC_{50} = 1500 \text{ mg/m}^3/4\text{h}$ (rat) (NLM Dataset);

Acute Oral toxicity:

Quantitative data on the acute oral/dermal toxicity of this product are not available.

Acute Dermal toxicity:

Skin corrosion/irritation:

Slight skin irritant.

Serious eye damage/irritation:

Slight eye irritation resulted from a brief spray of vapor.

Respiratory or skin sensitization:

The substance is not classified as skin sensitizer.

CMR effects (Carcinogenicity, Mutagenicity and Toxicity for Reproduction):

No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

The substance is not classified as mutagens or toxic to reproduction.

STOT-single exposure and repeated exposure:

Effects of short-term exposure:

Rapid evaporation of the liquid may cause frostbite. The substance may cause effects on the central nervous system and cardiovascular system, resulting in cardiac disorders.

Additional information:

No data available.

Section 12: Ecological information

12.1 Toxicity

Acute toxicity to fish: $LC_{50} = 450 \text{ mg/l/96h}$ (Rainbow Trout);

Acute toxicity to daphnia: $EC_{50} = 980 \text{ mg/l/48h}$ (Daphnia magna);

Acute toxicity to bacteria: Quantitative data on the acute bacteria toxicity of this product are not available.

12.2 Persistence and degradability

Decomposes comparatively rapidly in the lower atmosphere (troposphere).



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Atmospheric lifetime is 15.6 years.

Products of decomposition will be highly dispersed and hence will have a very low concentration.

12.3 Bioaccumulative potential

Estimated bioconcentration factors ranging from 5 to 58 can be calculated for R-134a based on its estimated log octanol/water partition coefficient, 1.274, and estimated water solubility, 67 mg/L at 25° C, in turn estimated from its estimated Henry's Law constant and estimated vapor pressure, using appropriate regression equations. These values indicate that R-134a will not bioconcentrate in fish and aquatic organisms.

12.4 Mobility in soil

Estimated soil adsorption coefficients ranging from 117 to 432 can be calculated for R-134a based on its estimated log octanol/water partition coefficient, 1.274, and estimated water solubility, 67 mg/L at 25°C, in turn estimated from its estimated Henry's Law constant and estimated vapor pressure, using appropriate regression equations. These values indicate that R-134a will display moderate to high mobility in soil. (HSDB)

12.5 Results of PBT and vPvB assessment

PBT/vPvB assessment information is not available as chemical safety assessment not conducted.

12.6 Other adverse effects

Global warming potential (GWP) = 1300

Fluorinated greenhouse gases, which has climatic warming potential.

Section 13: Disposal considerations

13.1 Waste treatment methods

However, HFC134a should be recycled, reclaimed or destroyed whenever possible. Container disposal: For disposable cylinders only. Do not distribute, make available, furnish or reuse empty container when once emptied of the original product. Open valve to remove pressure in the cylinder. Then puncture, drill, crush or otherwise destroy empty cylinder and dispose of in a facility permitted for nonhazardous waste.

Section 14: Transport information

14.1 Land transport (ADR/RID/GGVSE)

UN-No.:	3159
Official transport designation:	1,1,1,2-TETRAFLUOROETHANE (REFRIGERANT GAS R 134a)
Class:	2.2
Classification Code:	2A
Packing group:	-
Hazard label:	2.2



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14.2 Sea transport (IMDG-Code/GGVSee)

Proper Shipping Name: 1,1,1,2-TETRAFLUOROETHANE (REFRIGERANT GAS R 134a)
Class: 2.2
UN-No.: 3159
Packing group: -

14.3 Air transport (ICAO-TI/IATA-DGR)

Proper Shipping Name: 1,1,1,2-TETRAFLUOROETHANE (REFRIGERANT GAS R 134a)
Class: 2.2
UN-No.: 3159
Packing group: -

14.4 Additional information

No data available.

Section 15: Regulatory information

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

EU regulation:

Authorisations: No information available.
Restrictions on use: No information available.
EINECS: This substance is listed in the inventory.
DSD (67/548/EEC): This substance is not listed in the Annex I.
Regulation (EC) No 842/2006: This substance is listed in the Annex I of Regulation (EC) No 842/2006 on certain fluorinated greenhouse gases.

Other chemical regulation:

USA - TSCA: This substance is listed in the inventory.
Canada - DSL: This substance is listed in the inventory.
Australia - AICS: This substance is listed in the inventory.
Korea - ECL: This substance is listed in the inventory.
Japan - ENCS: This substance is listed in the inventory.
China - IECSC: This substance is listed in the inventory.

15.2 Chemical Safety Assessment

No Chemical Safety Assessment has been carried out for this substance.

Section 16: Other information



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16.1 Revision Information:

Date of the previous revision: Not applicable.

Date of this revision: 5/5/2023

16.2 Abbreviations and acronyms

CLP:	EU regulation (EC) No 1272/2008 on classification, labelling and packaging of chemical substances and mixtures.
CAS:	Chemical Abstracts Service (division of the American Chemical Society).
EINECS:	European Inventory of Existing Commercial Chemical Substances.
IARC:	International agency for research on cancer.
RID:	European Rail Transport.
IMDG:	International Maritime Code for Dangerous Goods.
IATA:	International Air Transport Association.
DSD:	Dangerous Substance Directive (67/548/EEC).
TSCA:	Toxic Substances Control Act, The American chemical inventory.
DSL:	Domestic Substances List, The Canadian chemical inventory.
AICS:	The Australian Inventory of Chemical Substances.
ECL:	Existing Chemicals List, the Korean chemical inventory.
ENCS:	Japanese Existing and New Chemical Substances.
IECSC:	Inventory of existing chemical substances in China.

16.3 Key literature references and sources for data

ESIS IUCLID Dataset: European chemical Substances Information System.

HSDB: Hazardous Substances Data Bank.

NLM Dataset: United States National library of medicine.

ICSC: International Chemical Safety Cards.

16.4 Relevant H-statements

H-statements (code and full text):

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

16.5 Training advice

Provide adequate information, instruction and training for operators.

16.6 Declare to reader

The information in this Safety Data Sheet (SDS) was obtained from sources which we believe are reliable. However, the information is provided without any warranty, express or implied, regarding its correctness. The conditions or methods of handling, storage, use or disposal of the product are beyond our control and may be beyond our knowledge. For this and other reasons, we do not assume responsibility and expressly disclaim liability for loss, damage or expense arising out of or in any way connected with the handling, storage, use or disposal of the product.



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This SDS was prepared and is to be used only for this product. If the product is used as a component in another product, this SDS information may not be applicable. According to REACH Article 31(5), the SDS shall be supplied in an official language of the Member State(s) where the substance or mixture is placed on the market, unless the recipient Member State(s) concerned provide otherwise. It should also be noted that this SDS is applicable to the countries with English as an official language.