

SAFETY DATA SHEET

R-134a

According to Regulation (EU) n ° 1907/2006 (Reach), Annex II

1. Identification of the substance/mixture and of the company/undertaking

Trade name: R-134a

Substance Name: Norflurane

Formula: 1,1,1,2-Tetrafluoroetano $\text{CF}_3\text{CH}_2\text{F}$

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

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

Identified Uses: Used as refrigerants.

Uses advised against: No uses advised against.

Manufacturer & Importer:

GEFRIEREN, S.A. de C.V.

Boulevard Benito Juárez 10, San Mateo Cuauhtepac, 54948 Tultitlán de Mariano Escobedo, Méx.

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2. Hazards identification:

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 substance

Label Elements:

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

Substance name: Norflurane

Symbols: GHS04

Hazard pictogram(s):



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

Other Hazards:

Fluorinated greenhouse gases, which has climatic warming potential.

3. Composition/Information on Ingredients.

Substance Information:

Substance Name	Cas No.	No CE	Concentración %	Fórmula molecular	Clasificación de conformidad con el Reglamento (UE) 1272/2008 (CLP)
1,1,1,2-Tetrafluoroetano (HFC 134a)	811-97-2	212-377-0	≥99.9	CF ₃ CH ₂ F	Press. Gas Liquefied gas; H280

4. First Aid Measures

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:

Extremely unlikely to occur.

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.

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.

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.

5. Fire-fighting Measures

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.

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.

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.

6. Accidental release measures

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.

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.

Methods and material for containment and cleaning up

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

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.

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.

7. Handling and storage

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.

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.

Specific end use(s)

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

8. Exposure controls/Personal protection

Control parameters:

Occupational exposure limit value:

R134a CAS # 811-97-2	Límites de Exposición Ocupacional			
	país de origen	A largo plazo / 8 horas		Corto plazo
Austria	1000 ppm	4200 mg/m ³	4000 ppm	16800 mg/m ³
Alemania (AGS)	1000 ppm	4200 mg/m ³	8000 ppm	33600 mg/m ³
Alemania (DFG)	1000 ppm	4200 mg/m ³	8000 ppm	33600 mg/m ³
Suecia	500 ppm	2000 mg/m ³	750 ppm	3000 mg/m ³
Suiza	1000 ppm	4200 mg/m ³	-	-
Reino Unido	1000 ppm	4240 mg/m ³	-	-

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

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 face shield 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 pressurized 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.

9. Physical and Chemical properties

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)
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%

10. Stability and Reactivity

Reactivity:

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

Chemical stability:

Stable under normal temperature conditions and recommended use.

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.

Conditions to avoid:

Avoid open flames and high temperatures.

Incompatible materials:

Finely divided metals, magnesium and alloys containing more than 2% magnesium.
 Strong oxidizing agents, Alkali metals.

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

11. TOXICOLOGICAL INFORMATION

TOXICOLOGICAL INFORMATION	
Toxicokinetic, metabolism and distribution	
R134a	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 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)
Information on toxicological effects	
Acute toxicity due inhalation	
R134a	LC50 = 1700 g/m ³ /2h (mouse) (NLM Dataset); LC50 = 1500 g/m ³ /4h (rat) (NLM Dataset);
Skin corrosion/Irritation	

R134a	Slight skin irritant.
Serious eye damage/irritation:	
R134a	Slight eye irritation resulted from a brief spray of vapor
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:	
R134a	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

12. ECOLOGICAL INFORMATION

TOXICITY	ACUTE TOXICITY TO FISH:
R134a	LC50 = 450 mg/l/96h (Rainbow Trout)
TOXICITY	ACUTE TOXICITY TO DAPHNIA:
R134a	EC50 = 980 mg/l/48h (Daphnia magna)
PERSISTENCE AND DEGRADABILITY	
R134a	Decomposes comparatively rapidly in the lower atmosphere (troposphere). Atmospheric lifetime is 15.6 years. Products of decomposition will be highly dispersed and hence will have a very low
BIOACCUMULATIVE POTENTIAL	
R134a	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.

MOBILITY IN SOIL	
R134a	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)

OTHER ADVERSE EFFECTS

R134a	Global warming potential (GWP) = 1300 Fluorinated greenhouse gases, which has climatic warming potential.
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13. Disposal Considerations:

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.

14. TRANSPORT INFORMATION

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

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:	-

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:	-

15. REGULATORY INFORMATION:

SAFETY, HEALTH AND ENVIRONMENTAL REGULATIONS/LEGISLATION SPECIFIC FOR THE MIXTURE:

EU regulation:

Authorizations: 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.

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

16. OTHER INFORMATION.

Abreviaciones y acrónimos

Abreviaciones y acrónimos	
CLP	EU regulation (EC) No 1272/2008 on classification, labelling and packaging of chemical substances and mixture.
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.

KEY LITERATURE REFERENCES AND SOURCES FOR DATA	
ESIS IUCLID Dataset:	European chemical Substances Information System.
HSDB:	Hazardous Substances Data Bank.
ICSC:	International Chemical Safety Cards.
NLM Dataset:	United States National library of medicine.
GESTIS Substance database.	

TRAINING ADVICE:

Provide adequate information, instructions and training for operators.

DECLARE TO READER:

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