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

1.1 Product identifier

Trade name
R134a

Substance name 1,1,1,2-tetrafluoroethane

Identification numbers
CAS no. 811-97-2
EC no. 212-377-0

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

Relevant identified uses of the substance or mixture
Industrial Use
Professional use
Refrigerant

Uses advised against
Consumer use

1.3 Details of the supplier of the safety data sheet

Address
Eppendorf AG
Barkhausenweg 1
D-22339 Hamburg

Telephone no. +49 40 53801-0

Information provided by / telephone
Eppendorf Application-Hotline
Tel.: +49 1803 66 67 89
Fax: +49 4053 99 01 25
email: support@eppendorf.com

Advice on Safety Data Sheet
sdb_info@umco.de

1.4 Emergency telephone number

For medical advice (in German and English):
+49 (0)551 192 40 (Giftinformationszentrum Nord)

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

Classification in accordance with Regulation (EC) No 1272/2008 (CLP)
Press. Gas; H280

Classification information
This product is assessed and classified using the methods and criteria below referred to in Article 9 of Regulation (EC) n° 1272/2008:
Physical hazards: determined through assessment data based on the methods or standards referred to in part 2 of Annex I to CLP
Health hazards and environmental hazards: determined through toxicological and ecotoxicological assessment data based on the methods or standards referred to in Part 3 and 4 of Annex I to CLP.

2.2 Label elements

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

Product identifier
811-97-2 (norflurane)

Hazard pictograms
Signal word
Warning

Hazard statement(s)
H280 Contains gas under pressure; may explode if heated.

Precautionary statement(s)

2.3 Other hazards
Danger of suffocation by displacement of air / oxygen. Contact with the liquid can cause cold burns or frostbite. Please observe the information given in this safety data sheet.

PBT assessment
The product is not considered to be a PBT.

vPvB assessment
The product is not considered to be a vPvB.

SECTION 3: Composition/information on ingredients

3.1 Substances
Chemical characterization
Substance name 1,1,1,2-tetrafluoroethane
Formula C2H2F4
Molecular weight 102.04

Identification numbers
CAS no. 811-97-2
EC no. 212-377-0

3.2 Mixtures
Not applicable. The product is not a mixture.

SECTION 4: First aid measures

4.1 Description of first aid measures

General information
In high concentrations may cause asphyxiation. Symptoms may include loss of mobility/consciousness. Victim may not be aware of asphyxiation. Remove affected person from danger area, lay him down. Seek medical advice immediately.

After inhalation
Remove affected persons from dangerous area by observing suitable respiratory protection measures. Ensure supply of fresh air. Irregular breathing/no breathing: artificial respiration. Call a doctor immediately.

After skin contact
In case of contact with skin wash off immediately with soap and water. Rinse with much water in case of frostbites. Remove clothes only after unfreezing. Cover wounds with sterile dressing. Call a doctor immediately.

After eye contact
Remove contact lenses. Rinse eye thoroughly under running water keeping eyelids wide open and protecting the unaffected eye (at least 10 to 15 minutes). Seek medical assistance.

After ingestion
Rinse mouth thoroughly with water. Do not induce vomiting. Never give anything by mouth to an unconscious person.

4.2 Most important symptoms and effects, both acute and delayed

Symptoms
The following symptoms may occur: respiratory arrest. Shortness of breath; Dazyness; muscle incoordination; Unconsciousness; cardiac arrhythmia; Nausea; headaches; Contact with liquefied gas can cause damage (frostbite) due to rapid evaporative cooling. May be fatal if inhaled.
4.3 **Indication of any immediate medical attention and special treatment needed**
Do not administer any preparations of the adrenaline-ephrine group. Treat symptomatically.

**SECTION 5: Firefighting measures**

5.1 **Extinguishing media**
- **Suitable extinguishing media**
  Extinguishing powder; Water spray jet; Water mist; Foam; Carbon dioxide; Extinguishing measures to suit surroundings.
- **Unsuitable extinguishing media**
  High power water jet

5.2 **Special hazards arising from the substance or mixture**
In the event of fire, the following can be released: Carbon monoxide and carbon dioxide; Hydrogen fluoride (HF); Carbonyl fluoride; May explode if exposed to heat. Liquefied gas: Spilled liquid can cause cold burns. This gas is heavier than air and may accumulate in low areas.

5.3 **Advice for firefighters**
Use self-contained breathing apparatus. Wear full protective suit. Containers close to fire should be transferred to a safe place. Cool closed containers exposed to fire with water. Pressure increase, bursting and explosion hazard during heating. Fire residues and contaminated firefighting water must be disposed of in accordance with the local regulations.

**SECTION 6: Accidental release measures**

6.1 **Personal precautions, protective equipment and emergency procedures**
- **For non-emergency personnel**
  Refer to protective measures listed in sections 7 and 8. Provide good room ventilation even at ground level (vapours are heavier than air). Do not breathe gas. Keep away sources of ignition. Use personal protective clothing. Cordon and mark contaminated area. Remove persons to safety.
- **For emergency responders**
  No data available. Personal protective equipment (PPE) - see Section 8.

6.2 **Environmental precautions**
Avoid release in the environment. Suppress gases/vapours/mists with water spray jet.

6.3 **Methods and material for containment and cleaning up**
Ensure adequate ventilation. Dispose of absorbed material in accordance with the regulations.

6.4 **Reference to other sections**
Information regarding safe handling, see chapter 7. Information regarding personal protective measures, see chapter 8. Information regarding waste disposal, see chapter 13.

**SECTION 7: Handling and storage**

7.1 **Precautions for safe handling**
- **Advice on safe handling**
  Only qualified and trained persons are authorised to handle. Provide good ventilation at the work area (local exhaust ventilation, if necessary). To be used only according to instructions for use. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose containers heat or sources of ignition. In case of accidental release: danger due to low temperature of the liquid product. The product should only be used in areas from which all naked lights and other sources of ignition have been excluded. Prevent the creation of flammable or explosive concentrations of vapour in air and avoid vapour concentration higher than the occupational exposure limits. Pressurized container: protect from sunlight and do not expose to temperatures exceeding 50 °C. Do not pierce or burn, even after use. Comply with the health and safety at work laws.
- **General protective and hygiene measures**
  Wash hands before breaks and after work. Do not inhale gases. Do not eat, drink or smoke during work time. Keep away from foodstuffs and beverages. Have emergency shower available.
- **Advice on protection against fire and explosion**
  The product is not combustible. The substance can form a combustible mixture with air at elevated pressure. Isolate
from sources of heat, sparks and open flame. Take precautionary measures against electrostatic loading (earthing necessary during loading operations). Electrical equipment should be protected to the appropriate standard.

### 7.2 Conditions for safe storage, including any incompatibilities

**Technical measures and storage conditions**

Keep container tightly closed in a cool, well-ventilated place, open and handle carefully. Protect from heat and direct sunlight.

**Recommended storage temperature**

Value: $< 50$ °C

**Requirements for storage rooms and vessels**

Containers which are opened must be carefully closed and kept upright to prevent leakage. Always keep in containers of same material as the original.

**Incompatible products**

Substances to be avoided, pls. See chapter 10.

### 7.3 Specific end use(s)

No data available.

### SECTION 8: Exposure controls/personal protection

#### 8.1 Control parameters

**Occupational exposure limit values**

<table>
<thead>
<tr>
<th>No</th>
<th>Substance name</th>
<th>CAS no.</th>
<th>EC no.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>norflurane</td>
<td>811-97-2</td>
<td>212-377-0</td>
</tr>
</tbody>
</table>

- List of approved workplace exposure limits (WELs) / EH40
- 1,1,1,2-Tetrafluoroethane (HFC134a)
- WEL long-term (8-hr TWA reference period)

| Value | 4240 | mg/m³ | 1000 | ppm |

#### 8.2 Exposure controls

**Appropriate engineering controls**

Ensure adequate ventilation, local exhaust at the work station if necessary. If these are not sufficient to maintain concentrations of particulates and solvent vapour below the OEL, suitable respiratory protection must be worn.

**Personal protective equipment**

**Respiratory protection**

Self-contained breathing apparatus. In case of insufficient ventilation or long-term effect use breathing apparatus. Danger of suffocation due to high concentrations in breathing air.

Respiratory filter (gas): AX

**Eye / face protection**

Tightly fitting safety glasses (EN 166).

**Hand protection**

Low-temperature-resistant gloves (EN 511). Sufficient protection is given wearing suitable protective gloves checked according to i.e. EN 374, in the event of risk of skin contact with the product. Before use, the protective gloves should be tested in any case for its specific work-station suitability (i.e. mechanical resistance, product compatibility and antistatic properties). Adhere to the manufacturer's instructions and information relating to the use, storage, care and replacement of protective gloves. Protective gloves shall be replaced immediately when physically damaged or worn. Design operations thus to avoid permanent use of protective gloves.

Appropriate Material: leather

**Other**

Chemical-resistant work clothes. Protective shoes.

### SECTION 9: Physical and chemical properties

#### 9.1 Information on basic physical and chemical properties

**Form/Colour**
<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Liquified gas</strong></td>
<td>Colourless</td>
</tr>
<tr>
<td><strong>Odour</strong></td>
<td>Slightly like ether</td>
</tr>
<tr>
<td><strong>Odour threshold</strong></td>
<td>No data available</td>
</tr>
<tr>
<td><strong>pH value</strong></td>
<td>No data available</td>
</tr>
<tr>
<td><strong>Boiling point / boiling range</strong></td>
<td>Value: -26 °C</td>
</tr>
<tr>
<td><strong>Melting point / melting range</strong></td>
<td>No data available</td>
</tr>
<tr>
<td><strong>Setting point / solidification range</strong></td>
<td>Value: -108 °C</td>
</tr>
<tr>
<td><strong>Decomposition point / decomposition range</strong></td>
<td>No data available</td>
</tr>
<tr>
<td><strong>Flash point</strong></td>
<td>No data available</td>
</tr>
<tr>
<td><strong>Auto-ignition temperature</strong></td>
<td>Value: 743 °C</td>
</tr>
<tr>
<td><strong>Oxidising properties</strong></td>
<td>The product does not have oxidizing properties.</td>
</tr>
<tr>
<td><strong>Explosive properties</strong></td>
<td>No data available</td>
</tr>
<tr>
<td><strong>Flammability (solid, gas)</strong></td>
<td>The product is non-flammable.</td>
</tr>
<tr>
<td><strong>Lower flammability or explosive limits</strong></td>
<td>No data available</td>
</tr>
<tr>
<td><strong>Upper flammability or explosive limits</strong></td>
<td>No data available</td>
</tr>
<tr>
<td><strong>Vapour pressure</strong></td>
<td>Value: 5700 hPa</td>
</tr>
<tr>
<td><strong>Vapour density</strong></td>
<td>No data available</td>
</tr>
<tr>
<td><strong>Evaporation rate</strong></td>
<td>Value: &gt;1</td>
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<tr>
<td><strong>Relative density</strong></td>
<td>Value: 4.24</td>
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<tr>
<td><strong>Density</strong></td>
<td>No data available</td>
</tr>
<tr>
<td><strong>Solubility in water</strong></td>
<td>Value: 1 g/l</td>
</tr>
</tbody>
</table>
EC safety data sheet

Trade name: R134a

Solubility(ies)
No data available

Partition coefficient: n-octanol/water
No data available

Viscosity
No data available

9.2 Other information
Other information
No data available.

SECTION 10: Stability and reactivity

10.1 Reactivity
Dangerous reactions are not expected if the product is handled according to its intended use. For the avoidance of thermal reaction does not overheat.

10.2 Chemical stability
Stable under recommended storage and handling conditions (See section 7).

10.3 Possibility of hazardous reactions
Stable under recommended storage and handling conditions (See section 7).

10.4 Conditions to avoid
Temperatures > 50°C. Heat, naked flames and other ignition sources.

10.5 Incompatible materials
Alkali metals; Earth alkali metals; Metal as powder; powdered metal salts

10.6 Hazardous decomposition products
None, if handled according to intended use. In case of fire: see section 5.

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute oral toxicity
No data available

Acute dermal toxicity
No data available

Acute inhalational toxicity
No data available

Skin corrosion/irritation
No data available

Serious eye damage/irritation
No data available

Respiratory or skin sensitisation
No data available

Germ cell mutagenicity
No data available

Reproduction toxicity
No data available

Carcinogenicity
No data available

STOT - single exposure
No data available
STOT - repeated exposure
No data available

Aspiration hazard
No data available

SECTION 12: Ecological information

12.1 Toxicity

**Toxicity to fish (acute)**
No data available

**Toxicity to fish (chronic)**
No data available

**Toxicity to Daphnia (acute)**
No data available

**Toxicity to Daphnia (chronic)**
No data available

**Toxicity to algae (acute)**
No data available

**Toxicity to algae (chronic)**
No data available

**Bacteria toxicity**
No data available

12.2 Persistence and degradability
No data available.

12.3 Bioaccumulative potential
No data available.

12.4 Mobility in soil
No data available.

12.5 Results of PBT and vPvB assessment

<table>
<thead>
<tr>
<th>Results of PBT and vPvB assessment</th>
<th>PBT assessment</th>
<th>vPvB assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>The product is not considered to be a PBT.</td>
<td>The product is not considered to be a vPvB.</td>
<td></td>
</tr>
</tbody>
</table>

12.6 Other adverse effects

**Other adverse effects**

Global Warming Potential (GWP): 1430

12.7 Other information

**Other information**
Do not discharge product unmonitored into the environment.

SECTION 13: Disposal considerations

13.1 Waste treatment methods

**Product**
Dispose of in accordance with local regulation.
Allocation of a waste code number, according to the European Waste Catalogue, should be carried out in agreement with the regional waste disposal company.

**Packaging**
Compressed gas packaging under pressure. Do not open by force. Do not heat above 50°C. Dispose of compressed gas packagings only if completely discharged. Do not burn empty compressed gas packagings. Do not pierce, cut or weld uncleaned containers.
SECTION 14: Transport information

14.1 Transport ADR/RID/ADN

<table>
<thead>
<tr>
<th>Class</th>
<th>2</th>
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<tbody>
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<td>Classification code</td>
<td>2A</td>
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<tr>
<td>Hazard identification no.</td>
<td>20</td>
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<tr>
<td>UN number</td>
<td>UN3159</td>
</tr>
<tr>
<td>Proper shipping name</td>
<td>1,1,1,2-TETRAFLUOROETHANE (REFRIGERANT GAS R 134a)</td>
</tr>
<tr>
<td>Tunnel restriction code</td>
<td>C/E</td>
</tr>
<tr>
<td>Label</td>
<td>2.2</td>
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<tr>
<td>RID:</td>
<td>(+13)</td>
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14.2 Transport IMDG

<table>
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<th>Class</th>
<th>2.2</th>
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</thead>
<tbody>
<tr>
<td>UN number</td>
<td>UN3159</td>
</tr>
<tr>
<td>Proper shipping name</td>
<td>1,1,1,2-TETRAFLUOROETHANE (REFRIGERANT GAS R134a)</td>
</tr>
<tr>
<td>EmS</td>
<td>F-C, S-V</td>
</tr>
<tr>
<td>Label</td>
<td>2.2</td>
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</tbody>
</table>

14.3 Transport ICAO-TI / IATA

<table>
<thead>
<tr>
<th>Class</th>
<th>2.2</th>
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</thead>
<tbody>
<tr>
<td>UN number</td>
<td>UN3159</td>
</tr>
<tr>
<td>Proper shipping name</td>
<td>1,1,1,2-TETRAFLUOROETHANE (REFRIGERANT GAS R134a)</td>
</tr>
<tr>
<td>Label</td>
<td>2.2</td>
</tr>
</tbody>
</table>

14.4 Other information

No data available.

14.5 Environmental hazards

Information on environmental hazards, if relevant, please see 14.1 - 14.3.

14.6 Special precautions for user

To be transported always in closed, upright and safe containers. Make sure that persons handling these containers are aware of the rules of conduct in case of incident or spillage.

14.7 Transport in bulk according to Annex II of Marpol and the IBC Code

Not relevant

SECTION 15: Regulatory information

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

EU regulations

<table>
<thead>
<tr>
<th>Regulation (EC) No 1907/2006 (REACH) Annex XIV (List of substances subject to authorisation)</th>
</tr>
</thead>
<tbody>
<tr>
<td>In accordance with the Reach regulation (EC) 1907/2006, the product does not contain any substances that are considered as subject to listing in annex XIV, inventory of substances requiring authorisation.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>REACH candidate list of substances of very high concern (SVHC) for authorisation</th>
</tr>
</thead>
<tbody>
<tr>
<td>In accordance with article 57 and article 59 of the Reach regulation (EC) 1907/2006, this substance is not considered as subject to listing in annex XIV, inventory of substances requiring authorisation (&quot;Authorization list&quot;).</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>The substance is not subject to the provisions of annex XVII (restriction entries) of the Reach regulation (EC) 1907/2006.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Directive 2012/18/EU on the control of major-accident hazards involving dangerous substances</th>
</tr>
</thead>
<tbody>
<tr>
<td>This substance is not subject to Part 1 or 2 of Annex I</td>
</tr>
</tbody>
</table>

Other regulations

<table>
<thead>
<tr>
<th>REGULATION (EU) No 517/2014 on fluorinated greenhouse gases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adhere to the national sanitary and occupational safety regulations when using this product.</td>
</tr>
</tbody>
</table>

15.2 Chemical safety assessment

A chemical safety assessment has been carried out for this substance.
SECTION 16: Other information

Sources of key data used to compile the data sheet:
National Threshold Limit Values of the corresponding countries as amended in each case.
Transport regulations according to ADR, RID, IMDG, IATA as amended in each case.
The data sources used to determine physical, toxic and ecotoxic data, are indicated directly in the corresponding chapter.

Department issuing safety data sheet
UMCO GmbH

This information is based on our present knowledge and experience.
The safety data sheet describes products with a view to safety requirements.
It does not however, constitute a guarantee for any specific product properties and shall not establish a legally valid contractual relationship.

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Prod-ID    762668