

MATERIAL SAFETY DATA SHEET

PRODUCT: R404a

1. PRODUCT IDENTIFICATION AND COMPANY DETAILS

Product: R404a

Company name: **Frogen UK**

Company contact: Tel: +44 (20) 7256 4000

2. COMPOSITION / INFORMATION ON INGREDIENTS

| EEC No. | HFC 143a: 206-996-5, HFC 125: 206-557-8, HFC 134a: 212-377-0 | | | |
|--------------------------------------|---|---------|--------|-----------|
| HAZARDOUS INGREDIENT | CAS No. | % (w/w) | Symbol | R Phrases |
| 1,1,1,-Trifluoroethane (HFC 143a) | 000420-46-2 | 52 | F+ | R12 |
| Pentafluoroethane (HFC 125) | 000354-33-6 | 44 | | |
| 1,1,1,2-Tetrafluoroethane (HFC 134a) | 000811-97-2 | 4 | | |

3. HAZARDS IDENTIFICATION

Low acute toxicity. High exposures may cause an abnormal heart rate, anaesthetic effect. Very high atmospheric concentrations may cause anaesthetic effects and asphyxiation. Liquid can cause burns to skin and eyes.

4. FIRST AID MEASURES

Inhalation: Immediately remove patient to fresh air and call doctor.

Ingestion: Do not induce vomiting. This is not considered a potential route for exposure. If patient is conscious, wash out mouth with water and get immediate medical attention.

Eye contact: Flush eyes with water.

Skin contact: Remove contaminated clothing. Wash with water on affected areas.

Personal Protection: Wear suitable protective clothing, gloves, face and eye protection. Wear thermal insulating gloves when handling liquefied gases. In cases of

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insufficient ventilation, where exposure of high concentrations of vapour is possible, suitable respiratory protective equipment with positive air supply should be used.

5. PHYSICAL & CHEMICAL PROPERTIES

| | | |
|-------------------------------|---|---|
| Appearance | : | Liquefied, colorless gas |
| Odour | : | Ether like (slight) |
| Physical state | : | Gas at normal temperature and pressure |
| Boiling point | : | - 47.2 °C to -46.4 °C (boiling range) |
| Vapour pressure | : | 8270 mm Hg at 20°C |
| Density (g/ml) | : | 1.06 at 20°C |
| Solubility in water | : | Insoluble |
| Solubility in other | : | Soluble in chlorinated solvents, esters and alcohols. |
| Vapour density (Air=1) | : | 3.42 approximately at bubble point temperature |

6. FIRE FIGHTING MEASURES

Flammable Properties: This refrigerant is Nonflammable under ambient temperature and pressure conditions.

Suitable extinguishing media: Allow gas fires to burn until exhausted. Water spray should be used to cool containers.

Specific methods: Heat of fire can build pressure in cylinder, hence move away from container. Immediately cool cylinder using water.

Special protective equipment for firefighting: Use self contained breathing apparatus.

7. STABILITY AND REACTIVITY

Hazardous reactions: Certain mixtures of HFC's and chlorine may be flammable or reactive under certain conditions.

In compatible materials: Finely divided metals, magnesium and alloys containing more than 2% magnesium. Can react violently if in contact with alkali metals, alkaline earth metals – sodium. May react violently with oxidizing agents.

Hazardous decomposition products: Hydrogen chloride, hydrogen fluoride by decomposition and hydrolysis.

8. TOXICOLOGICAL INFORMATION

Inhalation: High exposures may cause abnormal heart rate and prove suddenly fatal. Very high atmospheric concentrations may cause anaesthetic effects and asphyxiation.

Skin contact: Liquid can cause burns to skin. Unlikely to be hazardous by skin adsorption.

Eye contact: Liquid can cause burns to eyes.

Ingestion: Highly unlikely but should this occur freeze burns will result.

Long term exposure:

HFC 143a: An inhalation study in animals has shown that repeated exposures produces no significant effects (40,000 ppm in rats).

HFC 125: An inhalation study in animals has shown that repeated exposures produces no significant effects (50,000 ppm in rats).

HFC 134a: Long term inhalation and exposure of HFC 134a (50,000 ppm) in animals resulted in benign tumors of testes. The increased tumor incidence was observed only after prolonged exposure to high levels, leads to the conclusion that these results are not significant when considering the health of humans occupationally exposed the levels of HFC 134a at or below the occupational exposure limit.

9. ECOLOGICAL INFORMATION

Effect on effluent treatment: Discharges of the product will enter the atmosphere and will not result in long term aqueous contamination.

Persistence and degradation:

HFC 143a: Decomposed slowly in lower atmosphere (troposphere). Atmospheric lifetime in 53.5 years. Has Global Warming Potential (GWP) of 3800 (relative to 1 for carbon dioxide at 100 years).

HFC 125: Decomposed slowly in lower atmosphere (troposphere). Atmospheric lifetime in 32.6 years. Has Global Warming Potential (GWP) of 2800 (relative to 1 for carbon dioxide at 100 years).

HFC 134a: Decomposed comparatively rapidly at lower atmosphere (troposphere). Atmospheric lifetime is 13.6 years. Has Global Warming Potential (GWP) of 1300 (relative to a value of 1 for carbon dioxide at 100 years).

HFC 143a, HFC 125, HFC 134a: Does not influence photochemical smog.

10. DISPOSAL PROCEDURES

Best to recover and recycle. If it is not possible, destruction is to be in an approved facility, which is equipped to absorb and neutralize acid gases and other toxic processing products. Do not attempt to dispose of residual or unused quantities.

11. ACCIDENTAL RELEASE MEASURES

Personal precautions: Shut off valve and isolate source of leak if without risk. Move cylinder to well ventilated area. Evacuate area and ensure adequate ventilation. Prevent liquid from entering drainage. Contain spillages with sand, earth or suitable adsorbent material.

Environmental precautions: Keep personnel away. Try to stop release.

12. HANDLING AND STORAGE

Precautions to be taken in handling: Keep away from sources of ignition. Take precautionary measures against static discharges. Protect cylinders from damage. Do not drag, slide, roll or drop cylinders. Slowly open valve. Close cylinder valve after each use and keep closed even when cylinder is empty.

Never apply heat or flame to any part of cylinder. Avoid inhalation of high concentration of vapours. Avoid contact between liquid and skin and eyes.

Precautions to be taken in storage: Store and use with adequate ventilation.

Keep in a cool place away from fire risk, direct sunlight and all sources of heat.

Avoid storing near intake of air conditioning units, boiler units and open drains.

Store cylinders below 45 °C.

Process hazards: Liquid transfers between refrigerant containers can result instatic generation. Ensure adequate earthing.

13. TRANSPORT INFORMATION

| | | |
|---------------------|---|------------------------------------|
| UN Number | : | 3337 |
| AIR | | |
| ICAO/IATA - primary | : | 2.2 |
| SEA | | |
| IMDG – primary | : | 2.2 |
| Shipping name | : | Refrigerant R 404a |
| Marine pollutant | : | Not classified as marine pollutant |
| ROAD/ RAIL | | |
| ADR/RID Class | : | 2 |

14. REGULATORY INFORMATION

Not classified as harmful to users.

15. OTHER INFORMATION

Ensure all national / local regulations are observed and adhered to. Ensure that the operators understand the hazard of nitrogen enrichment. The hazard of asphyxiation is often overlooked and must be stressed during operator training.

Before using this product in any new process or experiment, a thorough material compatibility and safety study should be carried out.

The MSDS is based on reliable sources. Sufficient care has been taken in preparation of this document, however no liability for injury or damage resulting from its use can be accepted.

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