

MATERIAL SAFETY DATA SHEET

1. Chemical Product and Company Identification 274

R- 134a

General Use: Refrigerant

Alternate names: Fluorocarbon 134a, R134a, HFC134a, HFA134a

ZHEJIANG BINGER NEW TYPE REFRIGERANT CO., LTD.

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2. Composition Information on Ingredients

Ingredients: %(Wt) OSHA PEL

1,1,1,2-Tetrafluoroethane (CAS 811-97-2) 100 Not listed

3. Hazards Identification

Emergency Overview:

Appearance: Colorless liquified gas with faint ethereal odor

Physical hazards*: Compressed liquified gas

Health hazards': Harmful (central nervous system depression, cardiac arrhythmias)

*Hazard summary (as defined by OSHA Hazard Comm. Std., 29 CFR 1910.1200):

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.

Other effects of overexposure: None expected.

4. First Aid Measures

Skin: 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.

Eyes: 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.

Ingestion: Not applicable.

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. Do not administer adrenaline or similar sympathomimetic drugs as cardiac arrhythmias may result. Get immediate medical attention.

5. Fire Fighting Measures

Flashpoint and method: Does not flash

Autoignition temperature: Not applicable

Flammable limits (STP): Nonflammable

General hazards: Compressed liquified gas.

Heavy vapors can suffocate.

HFC 134a is not flammable in air under ambient conditions of temperature and pressure. Under conditions of high temperature and pressure, certain HFC 134a/air mixtures were shown to be flammable. Mixtures of HFC 134a 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.

Firefighting instructions: Not applicable. Use media suitable for surrounding fire. Use water spray to cool containers.

Firefighting equipment: Self-contained breathing apparatus with full facepiece and protective clothing.

Hazardous combustion products: Highly toxic decomposition products.

6. Accidental Release Measures

Precautions should take into account the severity of the leak or spill. 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.

7. Handling and Storage

Storage temperature: Keep at temperature not exceeding 120 deg. F. (49 deg. C.).

Storage: Keep in a cool, well ventilated place. Keep containers dry. Keep away from direct sunlight, heat and sources of ignition.

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.

8. Exposure Controls/Personal Protection

Exposure guidelines: No ACGIH TLV or OSHA PEL assigned. WEEL (AIHA): 1,000 ppm 8 hr TWA. Minimize exposure in accordance with good hygiene practice. INEOS FLUOR has established an occupational exposure limit of 1,000 ppm (8hr TWA) for this material. Engineering controls: Ventilate low-lying areas such as sumps or pits where dense vapors collect. Use ventilation adequate to maintain safe levels. Provide eyewash station in work area.

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.

Protective clothing: 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.

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

9. Physical and Chemical Properties

Appearance; Colorless liquified gas

Boiling point: -15.1 deg. F., -26.2 deg C.

Vapor pressure (mmHg at 20 deg . C.): 4268

Vapor density (air = 1): 3.3

Solubility in water: Very low

pH: Not applicable

Specific gravity: 1.23 at 20 deg. C.

% Volatile by volume: 100

10. Stability and Reactivity

Stability: Stable under normal conditions.

Incompatibility: Finely divided metals, magnesium and alloys containing more than 2% magnesium. Can react violently if in contact with alkali or alkali earth metals such as sodium, potassium or barium.

Stability and Reactivity (continued)

Hazardous decomposition products: Hydrogen fluoride by thermal decomposition and hydrolysis.

Hazardous polymerization: Will not occur.

11. Toxicological Information

Possible Human Health Effects:

Inhalation: High atmospheric concentrations may lead to anesthetic effects, including loss of consciousness. Very high exposures may cause an abnormal heart rhythm and prove suddenly fatal. Higher concentrations may cause asphyxiation due to reduced oxygen content of the atmosphere.

Skin contact: Liquid splashes or spray may cause freeze burns. Unlikely to be

hazardous by skin absorption.

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

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

Animal data:

The inhalation 4 hour LC50 in rats was greater than 500,000 ppm HFC 134a.

Slight eye irritation resulted from a brief spray of vapor.

The material was a slight skin irritant, but not a skin sensitizer.

The threshold for cardiac sensitization (arrhythmias) in dogs pretreated with epinephrine was an atmosphere of 75,000 ppm. The no observed effect level (NOEL) was 50,000 ppm. No effect of any kind was seen in a 90 day inhalation study in the rat at dose levels up to, and including 50,000 ppm (6 hours per day, 5 days per week).

No developmental effects were seen in the rabbit following inhalation exposure to 40,000 ppm during gestation despite slight maternal toxicity. In a range-finding study in the rabbit, possible minimal embryoletality was seen at a dose level of 50,000 ppm. In the rat, slight fetotoxicity was present at an inhalation dose of 50,000 ppm administered during gestation and no effects were seen at 10,000 ppm. In another study in the rat, no developmental effects were seen at a dose of 100,000 ppm in the presence of slight maternal toxicity; clear maternal effects were followed by embryotoxicity and fetotoxicity at a dose level of 300,000 ppm. There were no increases in the incidence of fetal malformations in rats or rabbits at doses up to and including 300,000 ppm and 50,000 ppm, respectively.

HFC 134a showed no genetic toxicity in a range of in-vitro and in-vivo tests. No adverse effects were found in a study in which rats were followed to week 104 after receiving 300 mg/kg bodyweight/day of HFC134a by gavage for 52 weeks. In a 2-year inhalation study in

rats, no adverse effects of any kind were observed except increased incidences of non-life threatening, benign, microscopic testicular interstitial (Leydig) cell tumors and associated interstitial cell hyperplasia which were confined to the top dose of 50,000 ppm.

12. Ecological Information

Persistence and degradation: 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 concentration. It is not a significant contributor to photochemical smog and is not considered to be a VOC. Is not considered an ozone depleting chemical.

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

13. Disposal Considerations

Disposal method: Discarded product is not a hazardous waste under RCRA, 40 CFR 261. 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. Refrigeration application: Subject to "no venting" regulations of Sections 608 and 609 of the Clean Air Act during the service or disposal of equipment.

14. Transport Information

DOT Hazard Description:

Proper Shipping Name: 1,1,1,2-TETRAFLUOROETHANE (R134A)

Hazard Class: 2.2

Identification Number: UN 3159

Packing Group): None

Hazardous Substance (RQ): None

Placard/Label: NON-FLAMMABLE GAS

15. Regulatory Information

TSCA (Toxic Substances Control Act) Regulations, 40 CFR 710: All Ingredients are on the TSCA Chemical Substances Inventory.

CERCLA and SARA Regulations (40 CFR 355, 370 and 372): This product does not contain any chemicals subject to reporting requirements of SARA Section 313.

16. Other Information

The information herein is given in good faith, but no warranty, expressed or implied, is made.

*** Indicate changes since prior revision.