



Material Safety Data Sheet

1. CHEMICAL PRODUCT/COMPANY IDENTIFICATION

MATERIAL IDENTIFICATION

Molecular Weight: 120

TRADE NAMES AND SYNONYMS

REFRIGERANT GAS R404A

COMPANY IDENTIFICATION

MANUFACTURER/DISTRIBUTOR' NAME

Hangzhou Fine Fluorotech Co., Ltd

No.1509 Bingsheng Road, Hangzhou, Zhejiang, China.

PHONE NUMBERS

Product Information: +86-571-86962376

Medical Emergency: +86-571-86962776

2. COMPOSITION/INFORMATION ON INGREDIENTS

COMPONENTS

Material	CAS Number	Weight %
Pentafluoroethane (HFC-125)	354-33-6	44
1,1,1-Trifluoroethane (HFC-143a)	420-46-2	52
1,1,1,2-Tetrafluoroethane (HFC-134a)	811-97-2	4

3. HAZARDS IDENTIFICATION

POTENTIAL HEALTH EFFECTS

EMERGENCY OVERVIEW

Colorless, volatile liquid with ethereal and faint sweetish odor. Non-flammable material. Overexposure may cause dizziness and loss of concentration. At higher levels, CNS



depression and cardiac arrhythmia may result from exposure. Vapors displace air and can cause asphyxiation in confined spaces. At higher temperatures, (>250 ° C), decomposition products may include Hydrofluoric Acid (HF) and carbonyl halides.

HUMAN HEALTH EFFECTS

SKIN

Irritation would result from a defatting action on tissue. Liquid contact could cause frostbite.

EYES

Liquid contact can cause severe irritation and frostbite. Mist may irritate.

INHALATION

R-404A is low in acute toxicity in animals. When oxygen levels in air are reduced to 12-14% by displacement, symptoms of asphyxiation, loss of coordination, increased pulse rate and deeper respiration will occur. At high levels, cardiac arrhythmia may occur.

INGESTION

Ingestion is unlikely because of the low boiling point of the material. Should it occur, discomfort in the gastrointestinal tract from rapid evaporation of the material and consequent evolution of gas would result. Some effects of inhalation and skin exposure would be expected.

DELAYED EFFECTS

None known.

Ingredients found on one of the OSHA designated carcinogen lists are listed below.

INGREDIENT NAME NTP STATUS IARC STATUS OSHA LIST

No ingredients listed in this section

4. FIRST AID MEASURES

SKIN

Promptly flush skin with water until all chemical is removed. If there is evidence of frostbite, bathe (do not rub) with lukewarm (not hot) water. If water is not available, cover with a clean, soft cloth or similar covering. Get medical attention if symptoms

persist.

EYES

Immediately flush eyes with large amounts of water for at least 15 minutes (in case of frostbite water should be lukewarm, not hot) lifting eyelids occasionally to facilitate irrigation. Get medical attention if symptoms persist.

INHALATION

Immediately remove to fresh air. If breathing has stopped, give artificial respiration. Use oxygen as required, provided a qualified operator is available. Get medical attention. Do not give epinephrine (adrenaline).

INGESTION

Ingestion is unlikely because of the physical properties and is not expected to be hazardous. Do not induce vomiting unless instructed to do so by a physician.

ADVICE TO PHYSICIAN

Because of the possible disturbances of cardiac rhythm, catecholamine drugs, such as epinephrine, should be used with special caution and only in situations of emergency life support. Treatment of overexposure should be directed at the control of symptoms and the clinical conditions.

5. FIRE FIGHTING MEASURES

FLAMMABLE PROPERTIES

FLASH POINT:	Gas, not applicable per DOT regulations
FLASH POINT METHOD:	Not applicable
AUTOIGNITION TEMPERATURE:	<750° C
UPPER FLAME LIMIT (volume % in air):	None*
LOWER FLAME LIMIT (volume % in air):	None*
	*Based on ASHRAE Standard 34 with match ignition
FLAME PROPAGATION RATE (solids):	Not applicable
OSHA FLAMMABILITY CLASS:	Not applicable

EXTINGUISHING MEDIA

Use any standard agent – choose the one most appropriate for type of surrounding fire (material itself is not flammable)



UNUSUAL FIRE AND EXPLOSION HAZARDS

R-404A is not flammable at ambient temperatures and atmospheric pressure. However, this material will become combustible when mixed with air under pressure and exposed to strong ignition sources.

Contact with certain reactive metals may result in formation of explosive or exothermic reactions under specific conditions (e.g. very high temperatures and/or appropriate pressures).

SPECIAL FIRE FIGHTING PRECAUTIONS/INSTRUCTIONS

Firefighters should wear self-contained, NIOSH-approved breathing apparatus for protection against possible toxic decomposition products. Proper eye and skin protection should be provided. Use water spray to keep fire-exposed containers cool.

6. ACCIDENTAL RELEASE MEASURES

IN CASE OF SPILL OR OTHER RELEASE

(Always wear recommended personal protective equipment.)

Evacuate unprotected personnel. Protected personnel should remove ignition sources and shut off leak, if without risk, and provide ventilation. Unprotected personnel should not return until air has been tested and determined safe, including lowlying areas.

Spills and releases may have to be reported to Federal and/or local authorities. See Section 15 regarding reporting requirements.

7. HANDLING AND STORAGE

NORMAL HANDLING

(Always wear recommended personal protective equipment.)

Avoid breathing vapors and liquid contact with eyes, skin or clothing. Do not puncture or drop cylinders, expose them to open flame or excessive heat. Use authorized cylinders only. Follow standard safety precautions for handling and use of compressed gas cylinders.

R-404A should not be mixed with air above atmospheric pressure for leak testing or any other purpose.

STORAGE RECOMMENDATIONS:

Store in a cool, well-ventilated area of low fire risk and out of direct sunlight. Protect cylinder and its fittings from physical damage. Storage in subsurface locations should be



avoided. Close valve tightly after use and when empty.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

ENGINEERING CONTROLS

Provide local ventilation at filling zones and areas where leakage is probable. Mechanical (general) ventilation may be adequate for other operating and storage areas.

PERSONAL PROTECTIVE EQUIPMENT

SKIN PROTECTION

Skin contact with refrigerant may cause frostbite. General work clothing and gloves (leather) should provide adequate protection. If prolonged contact with the liquid or gas is anticipated, insulated gloves constructed of PVA, neoprene or butyl rubber should be used. Any contaminated clothing should be promptly removed and washed before reuse.

EYE PROTECTION

For normal conditions, wear safety glasses. Where there is reasonable probability of liquid contact, wear chemical safety goggles.

RESPIRATORY PROTECTION

None generally required for adequately ventilated work situations. For accidental release or non-ventilated situations, or release into confined space, where the concentration may be above the PEL of 1,000 ppm, use a self-contained, NIOSH approved breathing apparatus or supplied air respirator. For escape: use the former or a NIOSH-approved gas mask with organic vapor canister.

ADDITIONAL RECOMMENDATIONS

Where contact with liquid is likely, such as in a spill or leak, impervious boots and clothing should be worn. High dose-level warning signs are recommended for areas of principle exposure. Provide eyewash stations and quick-drench shower facilities at convenient locations. For tank cleaning operations, see OSHA regulations, 29 CFR 1910.132 and 29 CFR 1910.133.

EXPOSURE GUIDELINES

INGREDIENT NAME	ACGIH TLV	OSHA PEL	OTHER LIMIT
Pentafluoroethane	None	None	1000 ppm TWA (8hr)
1, 1, 1-Trifluoroethane	None	None	1000 ppm TWA (8hr)



1, 1, 1, 2-Tetrafluoroethane	None	None	1000 ppm TWA (8hr)
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* = Limit established by National Refrigerants, Inc.

** = Workplace Environmental Exposure Level (AIHA)

*** = Biological Exposure Index (ACGIH)

OTHER EXPOSURE LIMITS FOR POTENTIAL

DECOMPOSITION PRODUCTS:

Hydrogen Fluoride: ACGIH TLV: 3 ppm ceiling

9. PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE:	Clear, colorless liquid and vapor
PHYSICAL STATE:	Gas at ambient temperatures
MOLECULAR WEIGHT:	120
CHEMICAL FORMULA:	CHF ₂ CF ₃ , CH ₃ CF ₃ , CH ₂ FCF ₃
ODOR:	Faint ethereal odor
SPECIFIC GRAVITY (water = 1.0):	1.08 @ 21.1° C (70° F)
SOLUBILITY IN WATER (weight %):	Unknown
PH:	Neutral
BOILING POINT:	-47.8° C (-54.0° F)
FREEZING POINT:	Not Determined
VAPOR PRESSURE:	182.9 psia @ 70° F 370.9 psia @ 130° F
VAPOR DENSITY (air = 1.0):	3.43
EVAPORATION RATE:	>1
COMPARED TO:	CCl ₄ = 1%
VOLATILES:	100
FLASH POINT:	Not applicable

(Flash point method and additional flammability data are found in Section 5.)

10. STABILITY AND REACTIVITY

NORMALLY STABLE? (CONDITIONS TO AVOID):

The product is stable.

Do not mix with oxygen or air above atmospheric pressure. Any source of high temperature, such as lighted cigarettes, flames, hot spots or welding may yield toxic and/or corrosive decomposition products.

INCOMPATIBILITIES:



(Under specific conditions: e.g. very high temperatures and/or appropriate pressures) –
Freshly abraded aluminum surfaces (may cause strong exothermic reaction). Chemically
active metals: potassium, calcium, powdered aluminum, magnesium and zinc.

HAZARDOUS DECOMPOSITION PRODUCTS:

Halogens, halogen acids and possibly carbonyl halides.

HAZARDOUS POLYMERIZATION:

Will not occur.

11. TOXICOLOGICAL INFORMATION

IMMEDIATE (ACUTE) EFFECTS:

HFC-125: LC50: 4 hr. (rat) - > 800,000 ppm / Cardiac Sensitization threshold (dog) 75,000 ppm

HFC-143a: LC50: 4hr. (rat) - > 540,000 ppm / Cardiac Sensitization threshold (dog) > 250,000 ppm

HFC-134a: LC50: 4hr. (rat) - > 500,000 ppm / Cardiac Sensitization threshold (dog) > 80,000 ppm

DELAYED (SUBCHRONIC AND CHRONIC) EFFECTS:

HFC-125: Teratogenic NOEL (rat and rabbit) – 50,000 ppm

Subchronic inhalation (rat) NOEL - > 50,000 ppm / Chronic NOEL – 10,000 ppm

HFC-143a: Teratogenic NOEL (rat and rabbit) – 50,000 ppm

Subchronic inhalation (rat) NOEL - > 50,000 ppm

HFC-134a: Teratogenic NOEL (rat and rabbit) – 40,000 ppm

Subchronic inhalation (rat) NOEL – 50,000 ppm / Chronic NOEL – 10,000 ppm

OTHER DATA:

HFC-125, HFC-134a: Not active in four genetic studies

HFC-143a: Not active in two genetic studies

12. ECOLOGICAL INFORMATION

Degradability (BOD): R-404A is a gas at room temperature; therefore, it is unlikely to remain in water.

Octanol Water Partition Coefficient: Unknown for mixture



13. DISPOSAL CONSIDERATIONS

RCRA

Is the unused product a RCRA hazardous waste if discarded?

Not a hazardous waste.

If yes, the RCRA ID number is: Not applicable.

OTHER DISPOSAL CONSIDERATIONS

Disposal must comply with federal, state, and local disposal or discharge laws. R-404A is subject to U.S. Environmental Protection Agency Clean Air Act Regulations Section 608 in 40 CFR Part 82 regarding refrigerant recycling.

The information offered here is for the product as shipped. Use and/or alterations to the product such as mixing with other materials may significantly change the characteristics of the material and alter the RCRA classification and the proper disposal method.

14. TRANSPORTATION INFORMATION

US DOT PROPER SHIPPING NAME: Refrigerant gas R 404A

US DOT HAZARD CLASS: 2.2

US DOT PACKING GROUP: Not applicable

US DOT ID NUMBER: UN3337

For additional information on shipping regulations affecting this material, contact the information number found in Section 1.

15. REGULATORY INFORMATION

TOXIC SUBSTANCES CONTROL ACT (TSCA)

TSCA INVENTORY STATUS: Components listed on the TSCA inventory

OTHER TSCA ISSUES: None

ADDITIONAL REGULATORY INFORMATION:

R-404A is subject to U.S. Environmental Protection Agency Clean Air Act Regulations at 40 CFR Part 82.



WARNING: Contains Pentafluoroethane (HFC-125), 1,1,1-trifluoroethane, tetrafluoroethane, greenhouse gases which may contribute to global warming. Do not vent to the atmosphere. To comply with provisions of the U.S.Clean Air Act, any residual must be recovered.

WHMIS CLASSIFICATION (CANADA):

This product has been evaluated in accordance with the hazard criteria of the CPR and the MSDS contains all the information required by the CPR.

FOREIGN INVENTORY STATUS:

EU – EINECS # 2065578 – HFC-125

2069965 – HFC-143a

223770 – HFC-134a

16. OTHER INFORMATION

The information given corresponds to the current state of our knowledge and experience of the product, and is not exhaustive. This applies to product that confirms to the specification, unless otherwise stated. In the case of combinations and mixtures one must make sure that no new dangers can arise. In any case, the user is not exempt from observing all legal, administrative and regulatory procedures relating to the product, personal hygiene, and protection of human welfare and environment.

Aug 10th, 2014.

End of MSDS