Material Safety Data Sheet
(REFRIGERANT R134a)

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1. PRODUCT AND COMPANY IDENTIFICATION

Material Identification

Corporate MSDS Number: HFC 134a CAS Number: 811-97-2
Product Name HFC 134a
Chemical Formula CH2FCF3
Chemical Name 1,1,1,2-tetrafluoroethane
Product Use refrigerant, foaming agent, propellant, solvent

Company Identification

MANUFACTURER/DISTRIBUTOR: JUHUA / MIPUNG/ MIPUNG

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Tel.: +82-43-883-3133 Fax: **:** +82-43-883-3135
PHONE NUMBERS Product Information: +82-43-883-3133
Transport Emergency: +82-43-883-3133
Medical Emergency: : +82-43-883-3133

2. COMPOSITION/INFORMATION ON INGREDIENTS

Chemical name of the substance: 1,1,1,2-TETRAFLUOROETHANE
General name: HALOGENATED HYDROCARBON
CAS Number: 811-97-2
Einecs Number: 212-377-0

Ingredient Name	CAS No.	Typical Wt. %
1,1,1,2-tetrafluoroethane (HFC 134a)	811-97-2	100%

3. HAZARDS IDENTIFICATION

EC Classification
EC Directive 67/548/EEC: Not classified
Regulation (EC) No. 1272/2008 (CLP): Gases under pressure – Liquefied gas

Potential Health Effects

INHALATION: Gross overexposure may cause: Central nervous system depression with dizziness, confusion, incoordination, drowsiness or unconsciousness. Irregular heart beat with a strange sensation in the chest, "heart thumping", apprehension, lightheadedness, feeling of fainting, dizziness, weakness, sometimes progressing to loss of consciousness and death. Suffocation, if air is displaced by vapors.

SKIN CONTACT: Immediate effects of overexposure may include: Frostbite, if liquid or escaping vapor contacts the skin.

EYE CONTACT: "Frostbite-like" effects may occur if the liquid or escaping vapors contact the eyes.

ADDITIONAL HEALTH EFFECTS: Increased susceptibility to the effects of this material may be observed in persons with pre-existing disease of the: central nervous system, cardiovascular system.

Carcinogenicity Information: None of the components present in this material at concentrations equal to or greater than 0.1% are listed by IARC, NTP, OSHA or ACGIH as a carcinogen.

4. FIRST AID MEASURES

INHALATION: If high concentrations are inhaled, immediately remove to fresh air. Keep person calm. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician.

SKIN CONTACT: In case of contact, immediately flush skin with plenty of water for at least 15 minutes, while removing contaminated clothing and shoes. Call a physician. Wash contaminated clothing before reuse. Treat for frostbite if necessary by gently warming affected area.

EYE CONTACT: In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Call a physician.

INGESTION: Ingestion is not considered a potential route of exposure.

Notes to Physicians: Because of possible disturbances of cardiac rhythm, catecholamine drugs, such as epinephrine, should only be used with special caution in situations of emergency life support.

5. FIRE FIGHTING MEASURES

Flammable Properties

Flash Point: Will not burn

Flammable limits in Air, % by Volume LEL: Not Applicable

UEL: Not Applicable Autoignition: >743 ℃(>1369 F)

Fire and Explosion Hazards: Cylinders may rupture under fire conditions. Decomposition may occur. Contact of welding or soldering torch flame with high concentrations of refrigerant can result in visible changes in the size and color of torch flames. This flame effect will only occur in concentrations of product well above the

recommended exposure limit, therefore stop all work and ventilate to disperse refrigerant vapors from the work area before using any open flames.

Potential combustibility: HFC-134a is not flammable at temperatures up to 100 deg C (212 deg F) at atmospheric pressure. However, mixtures of HFC-134a with high concentrations of air at elevated pressure can become combustible at ambient temperature. As the temperature of the mixture is increased, lower pressure but still greater than atmospheric pressurecan create the same effect. therefore, HFC-134a should not be mixed with air under pressure for leak testing or other purposes. In general, HFC-134a should not be used or allowed to exist with high concentrations of air above atmospheric pressure. Experimental data have also been reported which indicate combustibility of HFC-134a in the presence of certain concentrations of chlorine.

Fire and Explosion Hazards: Cylinders may rupture under fire conditions. Decomposition may occur. Contact of welding or soldering torch flame with high concentrations of refrigerant can result in visible changes in the size and color of the torch flame. This flame effect will only occur in concentrations of product well above the recommended exposure limit, therefore stop all work and ventilate the area before proceeding. Use forced ventilation to disperse refrigerant vapors from the work area before using any open flames.

Extinguishing Media: Use media appropriate for surrounding material.

Fire Fighting Instructions: Cool tank/container with water spray. Self-contained breathing apparatus (SCBA) may be required if cylinders rupture or release under fire conditions. Water runoff should be contained and neutralized prior to release.

6. ACCIDENTAL RELEASE MEASURES

Safeguards (Personnel)

NOTE: Review FIRE FIGHTING MEASURES and HANDLING (PERSONNEL) sections before proceeding with clean-up. Use appropriate PERSONAL PROTECTIVE EQUIPMENT during clean-up. Ventilate area, especially low or enclosed places where heavy vapors might collect. Remove open flames. Use self-contained breathing apparatus (SCBA) if large spill or leak occurs.

7. HANDLING AND STORAGE

Handling(Personnel) Use with sufficient ventilation to keep employee exposure below recommended limits. Handling (Physical Aspects) HFC-134a should not be mixed with air for leak testing or used for any other purpose above atmospheric pressure. See Flammable Properties section. Contact with chlorine or other strong oxidizing agents should also be avoided. **Storage** Store in a clean, dry place. Do not heat above 52 ℃(126° F).

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls Normal ventilation for standard manufacturing procedures is generally adequate. Local exhaust should be used when large amounts

are released. Mechanical ventilation should be used in low or enclosed places. Refrigerant concentration monitors may be necessary to etermine vapor concentrations in work areas prior to use of torches or other open flames, or if employees are entering enclosed areas.

Personal Protective Equipment Impervious gloves and chemical splash goggles should be used when handlinliquid. Under normal manufacturing conditions, no respiratory protection is required when using this product. Self-contained breathing apparatus (SCBA) is required if a large release occurs.

Exposure Guidelines

Exposure Limits R-134a
PEL (OSHA): None Established
TLV (ACGIH): None Established
AEL (Duran): 1000 ppm, 8 & 12 Hr. TWA
WEEL (AIHA): 1000 ppm, 8 Hr. TWA
AEL is Duran's Acceptable Exposure Limit. Where governmentally imposed occupational exposure limits, which are lower than, the AEL are in effect, such limits shall take precedence.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical Data

Boiling Point: -26.5 ℃ (-15.7° F) @ 736 mm Hg
Vapor Pressure: 96 psia @ 25 ℃ (77° F)
Vapor Density: 3.6 (Air=1.0) @ 25 ℃ (77° F)

%Volatiles: 100 WT%

Solubility in Water: 0.15 WT% @ 25 ℃ (77° F)@ 14.7 psia
Odor: Ether (slight)
Form: Liquefied Gas
Color: Colorless Liquid
Density: 1.21 g/cm3 @ 25 ℃ (77° F)
Specific Gravity: 1.208 @ 77 F (25 ℃)

Evaporation Rate: (CCL 4 = 1); greater than 1

10. STABILITY AND REACTIVITY

Chemical Stability

Conditions to Avoid: Avoid open flames and high temperatures.
Incompatibility with Other Materials: Incompatible with alkali or alkaline earth metals-powdered Al,Zn, Be, etc.
Decomposition: Decomposition products are hazardous. This material can be decomposed by high temperatures (open flames, glowing metal surfaces, etc.) forming hydrofluoric acid and possibly carbonyl fluoride. These materials are toxic and irritating. Contact should be avoided. Polymerization: Polymerization will not occur.

11. TOXICOLOGICAL INFORMATION

Animal Data: 1,1,1,2-TETRAFLUOROETHANE
EYE: A short duration spray of vapor produced very slight eye irritation.
SKIN: Animal testing indicates this material is a slight skin irritant, but not a skin sensitizer.
INHALATION: 4 hour, ALC, rat: 567,000 ppm.
Single exposure caused: Cardiac sensitization, a potentially fatal disturbance of heart rhythm associated with a heightened sensitivity to the action of pinephrine.
Lowest-Observed-Adverse-Effect-Level for cardiac sensitization: 75,000 ppm.
Single exposure caused: Lethargy. Narcosis. Increased respiratory rates.These effects were temporary.
Single exposure to near lethal doses caused: Pulmonary edema.
Repeated exposure caused: Increased adrenals, liver, spleen weight. Decreased uterine, prostate weight.
Repeated dosing of higher concentrations caused: the following temporareffects-Tremors.

Incoordination
CARCINOGENIC, DEVELOPMENTAL, REPRODUCTIVE, MUTAGENIC EFFECTS: In a two-year inhalation study, HFC-134a, at a concentration of 50,000 ppm, produced an increase in late-occurring benign testicular tumors, testicular hyperplasic and testicular weight. The no-effect-level for this study was 10,000 ppm. Animal data show slight fetotoxicity but only at exposure levels producinother toxic effects in the adult animal. Reproductive data on male mice show: No change in reproductive performance. Tests have shown that this material does not cause genetic damage in bacterial or mammalian cell cultures, or in animals. In animal testing, this material has not caused permanent genetic damage in reproductive cells of mammals (has not produced heritable genetic damage).

12. ECOLOGICAL INFORMATION

Ecotoxicological Information

AQUATIC TOXICITY: 48 hour EC50 -Daphnia magna: 980 mg/L. 96 hour LC50 -Rainbow trout: 450 mg/L.

13. DISPOSAL CONSIDERATIONS

Waste Disposal
Contaminated HFC-134a can be recovered by distillation or removed to a permitted waste disposal facility. Comply with Federal, State, and local regulations.

14. TRANSPORTATION INFORMATION

Shipping Information DOT/IMO
Receptacles, small, containing gas
Hazard Class: 2.2 UN No.: 2037

15. REGULATORY INFORMATION

U.S. Federal Regulations
TSCA Inventory Status: Reported/Included.
TITLE III HAZARD CLASSIFICATIONS SECTIONS 311, 312

Acute: Yes Chronic: Yes
Fire: No Pressure: Yes
Reactivity: No
HAZARDOUS CHEMICAL LISTS
SARA Extremely Hazardous Substance: No CERCLA Hazardous Substance: No
SARA Toxic Chemical: No

16. OTHER INFORMATION

NFPA, NPCA-HMIS
NPCA-HMIS Rating
Health: 1 Flammability: 0 Reactivity: 1 Personal Protection rating to be supplied by user depending on use conditions.
Additional Information
MEDICAL USE CAUTION: Do not use in medical applications involving permanent implantation in the human body.

The data in this Material Safety Data Sheet relates only to the specific material designated herein and does not relate to use in combination with any other material or in any process.

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End of MSDS