



TULSTAR PRODUCTS, INC.

5510 SOUTH LEWIS AVENUE • TULSA, OK 74105 • (918) 749-9060 • FAX (918) 747-1444

TULSTAR@TULSTAR.COM • WWW.TULSTAR.COM

MATERIAL SAFETY DATA SHEET

Company Information

Company Information: **TULSTAR PRODUCTS, INC.**
5510 S. Lewis Ave.
Tulsa, OK 74105
Phone Number: (918) 749-9060
Fax Number: (918) 747-1444
Email Address: tulstar@tulstar.com
Emergency Phone Number: CHEMTREC 800-424-9300 (24 hours)

Identity Information

Product Name: R 404a
Product Use: Refrigerant. High performance replacement for R22 and R502.

Ingredients Information

<u>Ingredient Name</u>	<u>CAS Number</u>	<u>Weight %</u>
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

Physical/Chemical Characteristics

Appearance:	Clear, colorless liquid and vapor
Odor:	Faint ethereal odor
Boiling Point:	-54°F, -47.8°C
Freezing Point:	Not determined
Vapor Pressure (MM Hg/70 F):	182.9
Vapor Density (Air=1):	3.43
Specific Gravity:	1.08
Physical State:	Gas at ambient temperatures
Molecular Weight:	120
Chemical Formula:	CF ₃ CHF ₂ ; CH ₃ CF ₃ ; CH ₂ FCF ₃
Solubility in Water (weight %):	Unknown
pH:	Neutral
Evaporation Rate:	>1
% Volatiles:	100
Flash Point:	Not applicable

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-	None. Based on ASHRAE Standard 34 with match ignition
Lower Flame Limit-	None. Based on ASHRAE Standard 34 with match ignition
Flame Propagation Rate-	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 & 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:	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.

Reactivity Data

Stability:	Yes
Cond To Avoid (Stability):	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 Decomp Products:	Halogens, halogen acids and possibly carbonyl halides.
Hazardous Poly Occur:	Will not occur.

Hazards Identification

EMERGENCY OVERVIEW:	Colorless, volatile liquid with ethereal and faint sweetish odor. Nonflammable 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 such as phosgene.
Potential Health Hazards:	
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

Accidental Release Measures

In Case of Spill or Other Releases:	(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 low-lying areas. Spills and releases may have to be reported to Federal and/or local authorities.
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Handling & Storage

Normal Handling:	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 compress gas cylinders. R 404a should not be mixed with air above atmospheric pressure for leak testing or any other purpose.
Storage:	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. If container temperature exceeds boiling point, cool the container before opening.

Control Measures

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 splash-proof 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 FEL of 1000 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:

<u>Ingredient Name</u>	<u>ACGIH TLV</u>	<u>OSHA PEL</u>	<u>OTHER LIMIT</u>
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)

* Workplace Environmental Exposure Level (AIHA)

Other exposure limits for potential decomposition products- Hydrogen Fluoride: ACGIH TLV- 3 ppm ceiling

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

Toxicological Information

Immediate (Acute) Effects:

HFC 125-	LC50 = 4 hr (rat)	> 800,000 ppm
	Cardiac Sensitization threshold (dog)	75,000 ppm
HFC 143a-	LC50 = 4 hr (rat)	> 540,000 ppm
	Cardiac Sensitization threshold (dog)	> 250,00 ppm
HFC 134a-	LC50 = 4 hr (rat)	> 500,00 ppm
	Cardiac Sensitization threshold (dog)	> 80,000 ppm

Delayed (Subchronic & Chronic) Effects:

HFC 125-	Teratogenic NOEL (rat & rabbit)	50.000 ppm
	Subchronic inhalation (rat) NOEL	=50.000 ppm
	Chronic NOEL	10,000 ppm
HFC 143a-	Teratogenic NOEL (rat & rabbit)	50.000 ppm
	Subchronic inhalation (rat) NOEL	=50.000 ppm

HFC 134a-	Teratogenic NOEL (rat & rabbit)	40.000 ppm
	Subchronic inhalation (rat) NOEL	50.000 ppm
	Chronic NOEL	10,000 ppm
Other Data:	HCF 125, HCF 134a are not active in four genetic studies.	
	HCF 143a is not active in two genetic studies.	

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.

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 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.

Transport Information

US DOT Hazard Class:
 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: UN 3337

Regulatory Information

Toxic Substances Control Act (TSCA):
 TSCA Inventory Status- Components listed on the TSCA inventory
 Other TSCA Issues- None

SARA Title III/CERCLA:
 "Reportable Quantities" (RQs) and/or "Threshold Planning Quantities" (TPDs) exist for the following ingredients.

<u>Ingredient Name</u>	<u>SARA/CERCLA RQ (lb.)</u>	<u>SARA EHS TPQ (lb.)</u>
No ingredients listed in this section		

Spills or released resulting in the loss of any ingredient at or above its RQ requires immediate notification to the Nation Response Center 800-424-8802 and to your Local Emergency Planning Committee.

Section 311 Hazard Class: Immediate Pressure

SARA 313 Toxic Chemicals: The following ingredients are SARA 313 "Toxic Chemicals".

<u>Ingredient Name</u>	<u>Comment</u>
No ingredients listed in this section.	

State Right-to-Know: In addition to the ingredients found, the following are listed for state-to-know purposes.

<u>Ingredient Name</u>	<u>Weight %</u>	<u>Comment</u>
No ingredient listed in this section		

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.