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)

Product Information

Product Name:	401b
Other Generic names:	Difluoromethane (HFC-32) Pentafluoroethane (HFC-125) 1,1,1,2-Tetrafluoroethane (HFC-134a)
Product Use:	Refrigerants

Composition/Information on Ingredients

Ingredient Name	CAS Number	Weight %
Difluoromethane (HFC-32)	75-10-5	23
Pentafluoroethane (HFC-125)	354-33-6	25
1,1,1,2-Tetrafluoroethane (HFC-134a)	811-97-2	52

Hazards Identification

Emergency Overview: Colorless, volatile liquid with ethereal and faint sweetish odor. 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.

Potential Health Hazards:

Skin- Irritation would result from defatting of tissue. Liquid contact may cause frostbite. Necrosis from freezing of tissue could occur.

Eyes- Contact with liquid may cause irritation, which may be severe. Mist may irritate.

Inhalation- All the HCFC's are of low order 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 occur. At higher levels, cardiac arrhythmia may occur.

Ingestion- Although ingestion is unlikely, discomfort in the gastrointestinal tract would result from rapid evaporation (boiling) of the material, and consequent evolution of gas. In addition, some of the effects of inhalation would be expected. Necrosis from freezing of tissue could occur.

Delayed Effects- None known

First Aid Measures

Skin: Promptly flush skin with water until all the chemical is removed. If there is evidence of frostbite, bath (do not rub) with lukewarm (not hot) water. In the absence of water, cover with a clean soft cloth or similar covering. Call a physician.

Eye: Immediately flush eyes with large amounts of water for at least 15 minutes, 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. Call a physician. Do not give epinephrine (adrenaline).

Ingestion: Ingestion is unlikely because of the physical properties of the mixture, 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 only in situations of emergency life support. Treatment of overexposure should be directed at the control of symptoms and the clinical conditions.

Fire Fighting Measures

Flammable Properties:

Flash Point- None
Autoignition Temperature- Unknown
Upper Flame Limit (Volume % in air)- None
Lower Flame Limit (Volume % in air)- None
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.

Unusual Fire & Explosion Hazards: It 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 finely divided reactive metals may cause exothermic reactions and/or explosive combinations. Decomposition products may be hazardous.

Special Fire Fighting Precautions: Firefighters should wear self-contained, NIOSH-approved breathing apparatus for protection against suffocation and possible toxic decomposition products. Proper eye and skin protection should be provided. Use water spray to keep fire-exposed containers cool and to knock down vapors which may result from product decompositions.

Accidental Release Measures

In Case of Spill or Other Release: Always wear recommended personal protective equipment. Evacuate all unprotected personnel. Personnel using self-contained breathing apparatus, and other protective equipment, should try to eliminate any possible ignition source and close valves or repair source of leak.

Handling & Storage

Normal Handling: Always wear recommended personal protective equipment. Avoid breathing vapors or liquid contact with eyes, skin or clothing. Do not puncture or drop containers, expose them to flame or excessive heat or drilling. Tank cleaning personnel should use only a formal tank entry procedure based on recognized safety principles. It 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. Protect container and its fittings from physical damage. Storage in subsurface locations should be avoided. Close valve tightly and replace container guard after use and when empty.

Exposure Controls/Personal Protection

Engineering Controls: Provide local exhaust at filling zones and areas where leakage is probable. Mechanical ventilation may be adequate for other operating and storage areas.

Personal Protection Equipment:

Skin Protection- Skin contact with refrigerant gases may cause frostbite. General work clothing and gloves (leather) should be provide adequate protection under routine conditions. 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. Contact lenses should not be worn under such conditions.

Respiratory Protection- None generally required for adequately vented work situations. For accidental or non-ventilated situations, use a self-contained NIOSH approved breathing apparatus.

Additional Recommendations- High dose-level warning signs are recommended for areas of principal exposure. Provide eyewash stations and quick drench shower facilities at convenient locations. For tank cleaning operations, see OSHA regulations.

Exposure Guidelines:

Ingredient Name	ACGIH TLV	OSHA PEL	Other Limit
Difluoromethane	1000	None	1000 ppm TWA
Pentafluoroethane	None	None	1000 ppm TWA
1,1,1,2-Tetrafluoroethane	None	None	1000 ppm TWA

Physical & Chemical Properties

Appearance:	Clear, colorless gas
Physical State:	Material is a liquefied gas at normal conditions
Molecular Weight:	86.2
Chemical Formula:	$CH_2F_2/CF_3CHF_2/CF_3CFH_2$
Odor:	Faint ethereal odor.
Specific Gravity:	1.16@21.1°C (70°F) (Water = 1.0)
Solubility in Water:	Aprox. 0.15 wt % @ 25°C (77°F) (Weight %)
pH:	Neutral
Boiling Point:	-43°C (-45.4°F)
Melting Point:	Unknown
Vapor Pressure:	156.2 psia @ 70°F (21.1°C)
Vapor Density:	3.0 (Air = 1.0)
Evaporation Rate:	Greater than 1 Compared to: CCl_4
% Volatiles:	% Volatiles by volume @ 68°F (20°C) = 100
Flash Point:	None

Stability & 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 sports, welding, may yield toxic or corrosive decomposition products.

Incompatibilities: Freshly abraded aluminum surfaces may cause strong exothermic reaction. Chemically active metals- sodium, potassium, calcium, powdered magnesium, and zinc.

Hazardous Decomposition Products: Halogens, halogen acids, and possible carbonyl halides, such as phosgene. These are toxic and corrosive.

Hazardous Polymerization: Will not occur.

Toxicological Information

Immediate (acute) effects: LC_{50} 4HR (rat)- 500,000 ppm
Cardiac Sensitization Threshold (dog)- 750,000 ppm

Delayed (Subchronic & Chronic) Effects: The only effect seen at 50,000 ppm were late developing benign tumors.
Chronic Inhalation NOEL (rat)- 10,000 ppm
Not teratogenic (rat)
Subchronic (rat)- 50,000 ppm

Other Data: Genetic Studies- Ames Assay (weak positive)
Cell Transformation (equivocal)
Dominant Lethal (not active)
Rat Micronucleus (not active)

Values listed are the lowest of any of the components.

Ecological Information

Degardability/Aquatic Toxicity: Not considered biodegradable; 100% volatile.

Disposal Considerations

RCRA: Is the unused product a RCRA hazardous water if discarded? Not a "hazardous waste" if discarded.
If yes, the RCRA ID number is- Not applicable

Other Disposal Considerations: Disposer must comply with federal, state and local disposal or discharge laws. Disposal of 407a may be subject to state and local regulations. User should review their operations in terms of applicable state and local laws and regulations, then consult with appropriate regulatory agencies before discharging or disposing of waste material.

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.

Transport Information

US DOT Hazard Class: US DOT proper shipping name- Liquefied gas (difluoromethane, tetrafluoroethane, pentafluoroethane)
US DOT Hazard Class- 2.2
US DOT Packing Group- Not applicable

US DOT ID Number: UN3163