



MATERIAL SAFETY DATA SHEET

R-401A and R-401B
May 2011

CHEMICAL PRODUCT/COMPANY IDENTIFICATION

MATERIAL IDENTIFICATION

Formula: CHCIF2/CH3CHF2/CHCIFCF3

TRADENAMES AND SYNONYMS

COMPANY IDENTIFICATION

Manufacturer/Distributor

Hudson Technologies Company
One Blue Hill Plaza, PO Box 1541
Pearl River, NY 10965

Phone Numbers

Product information: 1-800-953-2244
Transport Emergency: CHEMTREC 1-800-424-9300
Medical Emergency: 1-800-501-4376

COMPOSITION/INFORMATION ON INGREDIENTS

COMPONENTS

Material	CAS Number	%
R-401A		
* METHANE, CHLORODIFLUORO- (HCFC-22)	75-45-6	53
ETHANE, 1,1-DIFLUORO- (HFC-152a)	75-37-6	13
* ETHANE, 2-CHLORO-1,1,1,2-TETRAFLUORO (HCFC-124)	2837-89-0	34
R-401B		
* METHANE, CHLORODIFLUORO- (HCFC-22)	75-45-6	61
ETHANE, 1,1-DIFLUORO- (HFC-152a)	75-37-6	11
* ETHANE, 2-CHLORO-1,1,1,2-TETRAFLUORO (HCFC-124)	2837-89-0	28

* Disclosure as a toxic chemical is required under Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR part 372.

HAZARDS IDENTIFICATION

POTENTIAL HEALTH EFFECTS

Inhalation of high concentrations of vapor is harmful and may cause heart irregularities, unconsciousness, or death. Intentional misuse or deliberate inhalation may cause death without warning. Vapor reduces oxygen available for breathing and is heavier than air. Liquid contact can cause frostbite.

HUMAN HEALTH EFFECTS:

Skin contact may cause frostbite from exposure to the liquid. Inhalation may include nonspecific discomfort, such as nausea, headache, or weakness; or temporary nervous system depression with anesthetic effects such as dizziness, headache, confusion, incoordination, and loss of consciousness.

Higher exposures to vapors may lead to these effects: temporary lung irritation effects with cough, discomfort, difficulty breathing, or shortness of breath; temporary alteration of the heart's electrical activity with irregular pulse, palpitations, or inadequate circulation; abnormal kidney function as detected by laboratory tests; or fatality from gross overexposure. Individuals with preexisting diseases of the central nervous system, cardiovascular system, lungs or kidneys may have increased susceptibility to the toxicity of excessive exposures.



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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.

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

Flush skin with water for at least 15 minutes after excessive contact. Seek medical assistance if irritation is present. 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.

FIRE FIGHTING MEASURES

FLAMMABLE PROPERTIES

Flash Point: No flash point
Flammable Limits in Air, % by Volume:
LEL: None per ASTM E681
UEL: None per ASTM E681
Autoignition: 681 C (1258 F) R-401A
685 C (1265 F) R-401B

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.

R-401A and R-401B are not flammable in air at temperatures up to 100 deg C (212 deg F) at atmospheric pressure. However, mixtures of these products with high concentrations of air at elevated pressure and/or temperature can become combustible in the presence of an ignition source. These products can also become combustible in an oxygen enriched environment (oxygen concentrations greater than that in air). Whether a mixture containing these products and air, or these products in an oxygen enriched atmosphere becomes combustible depends on the inter-relationship of 1) the temperature 2) the pressure, and 3) the proportion of oxygen in the mixture. In general, these products should not be allowed to exist with air above atmospheric pressure or at high temperatures; or in an oxygen enriched environment.

For example: these products should NOT be mixed with air under pressure for leak testing or other purposes. Experimental data have also been reported which indicate combustibility of HCFC-22, a component in these products, in the presence of chlorine.



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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.

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.

SPILL CLEAN UP

Comply with Federal, State, and local regulations for reporting releases.

HANDLING AND STORAGE

HANDLING (PERSONNEL)

Avoid breathing vapors or mist. Avoid contact with eyes or skin. Use with sufficient ventilation to keep employee exposure below recommended limits.

STORAGE

Store in a clean, dry place. Do not heat above 52 C (126 F).

EXPOSURE CONTROLS/PERSONAL PROTECTION

ENGINEERING CONTROLS

Use sufficient ventilation to keep employee exposure below recommended limits. 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 determine vapor concentrations in work areas prior to use of torches or other open flames, or if employees are entering enclosed areas.

PERSONAL PROTECTIVE EQUIPMENT

Lined butyl gloves should be used to avoid prolonged or repeated exposure.
Chemical splash goggles should be available for use as needed to prevent eye contact.
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

APPLICABLE EXPOSURE LIMITS

METHANE, CHLORODIFLUORO- PEL (OSHA) TLV (ACGIH)	(HCFC-22) None Established 1,000 ppm, 3,540 mg/m ³ , 8 Hr. TWA, A4
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ETHANE, 1,1-DIFLUORO- (HFC-152a) PEL (OSHA) TLV (ACGIH) WEEL (AIHA)	None Established None Established 1000 ppm, 8 Hr. TWA
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ETHANE, 2-CHLORO-1,1,1,2-TETRAFLUORO



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PEL (OSHA)	None Established
TLV (ACGIH)	None Established
WEEL (AIHA)	1000 ppm, 8 Hr. TWA

PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL DATA

Boiling Point of Saturated Liquid	-33 C (-27 F) R-401A
Vapor Pressure of Saturated Liquid	112.1 psia @ 25 C (77 F) R-401A
Vapor Density	3.3 (Air=1.0) @ 25 C (77 F) R-401A
Liquid Density	1.194 g/cm ³ @ 25 C (77 F) R-401A
Boiling Point of Saturated Liquid	-34.6 C (-30.3 F) R-401B
Vapor Pressure of Saturated Liquid	118.8 psia @ 25 C (77 F) R-401B
Vapor Density	3.2 (Air=1.0) @ 25 C (77 F) R-401B
Liquid Density	1.193 g/cm ³ @ 25 C (77 F) R-401B
% Volatiles	100 WT%
Evaporation Rate	>1 (CCl ₄ =1.0)
Solubility in Water	0.1 WT% @ 25 C (77 F)
Odor : Ether (slight).	
Form : Liquified Gas.	
Color : Clear, Colorless.	

STABILITY AND REACTIVITY

CHEMICAL STABILITY

Stable

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 hydrochloric and hydrofluoric acids, and possibly carbonyl halides.

POLYMERIZATION

Polymerization will not occur.



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TOXICOLOGICAL INFORMATION

ANIMAL DATA

The blend is untested.

CHLORODIFLUOROMETHANE (HCFC-22)

Inhalation 4-hour LC50: 220,000 ppm in rats

The compound is a skin irritant and a slight eye irritant, but is not a skin sensitizer in animals.

Effects from single high exposures include central nervous system depression, anesthesia, rapid breathing, lung congestion and microscopic liver changes. Cardiac sensitization occurred in dogs at 50,000 ppm or greater from the action of exogenous epinephrine.

No toxic effects or abnormal histopathological observations occurred in rats repeatedly exposed to concentrations ranging from 10,000 to 50,000 ppm (v/v). Long-term exposures to 50,000 ppm (v/v) of vapors produced organ weight increases and a decrease in body weight gain, but no increased mortality or adverse hematological effects.

In chronic inhalation studies, HCFC-22, at a concentration of 50,000 ppm (v/v), produced a small, but statistically significant increase of late-occurring tumors involving salivary glands in male rats, but not female rats or male or female mice. In the same studies, no increased incidence of tumors was seen in either species at concentrations of 10,000 ppm or 1000 ppm (v/v). Long-term administration in corn oil produced no effects on body weight or mortality.

HCFC-22 was mutagenic in some strains of bacteria in cell cultures, but not in mammalian cell cultures or animals. It did not cause heritable genetic damage in mammals.

A slight, but significant increase in developmental toxicity was observed at high concentrations (50,000 ppm) of HCFC-22, a concentration which also produced toxic effects in the adult animal. Based on these findings, and other negative developmental studies, HCFC-22 is not considered a unique hazard to the conceptus. Studies of the effects of HCFC-22 on male reproductive performance have been negative. Specific studies to evaluate the effect on female reproductive performance have not been conducted, however, limited information obtained from studies on developmental toxicity do not indicate adverse effects on female reproductive performance at concentrations up to 50,000 ppm.

DIFLUOROETHANE (HFC-152a)

Inhalation 4-hour ALC	383,000 ppm in rats
Oral ALD	>1,500 mg/kg in rats

Effects of a single exposure to high levels include labored breathing, lung irritation, lethargy, incoordination and loss of consciousness. Cardiac sensitization occurred in dogs exposed to a concentration of 150,000 ppm in air and given an intravenous epinephrine challenge. Effects of repeated exposure include increased urinary fluoride, reduced kidney weight, and reversible kidney changes.

Effects of a single high oral dose include weight loss and lethargy.

Tests in animals demonstrate no carcinogenic activity or developmental effects. Tests in animals for reproductive effects have not been performed. This compound does not produce genetic damage in bacterial cell cultures but has not been tested in animals.

CHLOROTETRAFLUOROETHANE (HCFC-124)

Inhalation 4-hour ALC	>230,000 ppm in rats
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The effects in animals from single inhalation exposures by inhalation include central nervous system effects, anesthesia and decreased blood pressure. Cardiac sensitization occurred in dogs exposed to a concentration of 2.5% in air and given an intravenous epinephrine challenge. Repeated exposures produced increased liver weights, anesthetic effects, irregular respiration, poor coordination and nonspecific effects such as decreased body weight gain. However, no irreversible effects were seen as evidenced by histopathologic evaluation. Tests in animals suggest no developmental toxicity potential. HCFC-124 was not mutagenic in bacterial and mammalian cell cultures or whole animal studies.

ECOLOGICAL INFORMATION

ECOTOXICOLOGICAL INFORMATION

Reclaim by distillation or remove to permitted waste facility. Dispose of in accordance with all Federal, State, and local regulations.

Aquatic Toxicity:

HCFC-22

48 hour EC50 - Daphnia magna: 433 mg/L

DISPOSAL CONSIDERATIONS

WASTE DISPOSAL

Treatment, storage, transportation, and disposal must be in accordance with applicable Federal, State/Provincial, and Local regulations. Recover by distillation or remove to a permitted waste disposal facility.

TRANSPORTATION INFORMATION

SHIPPING INFORMATION

DOT/IMO/IATA

Proper Shipping Name

Liquefied Gas, N.O.S.
(Chlorodifluoromethane and Chlorotetrafluoroethane)

Hazard Class

2.2

UN No.

3163

Label(s)

Nonflammable Gas

Shipping Containers

Tank Cars
Cylinders
Ton Tanks

REGULATORY INFORMATION

U.S. FEDERAL REGULATIONS

TSCA Inventory Status : Reported/Included.

TITLE III HAZARD CLASSIFICATIONS SECTIONS 311, 312

Acute	Yes
Chronic	No

Fire	No
Reactivity	No
Pressure	Yes

HAZARDOUS CHEMICAL LISTS

SARA Extremely Hazardous Substance:	No
CERCLA Hazardous Substance	No
SARA Toxic Chemical	See Components Section



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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.

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.

Responsibility for MSDS:
MSDS Coordinator
Responsibility for MSDS: Stephen Mandracchia
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Pearl River, NY 10965
800-953-2244

This information is based upon technical information believed to be reliable. It is subject to revision as additional knowledge and experience is gained.

End of MSDS