HOT SHOT™
Material Safety Data Sheet

Nontoxic • Nonflammable • Tested to ASTME 681

Chemical Products

PRODUCT NAME:	**Hot Shot**
OTHER/GENERIC NAMES:	R-414B
PRODUCT USE:	Refrigerant
MANUFACTURER:	ICOR International, Inc. 10640 E. 59th St. Indianapolis IN 46236

FOR MORE INFORMATION CALL:
(Monday-Friday, 8:00am-4:30pm)
(800) 457-6805

IN CASE OF EMERGENCY CALL:
(24 Hours/Day, 7 Days/Week)
1-800-707-4555
CHEMTREC: 1-800-424-9300

Composition/INFO

Ingredient Name	CAS Registry Number	Typical Wt. %	OSHA
Chlorodifluoromethane	75-45-6	50%	Y
2-Chloro-1,1,1,2-tetrafluroethane	2837-89-0	38%	Y
1-Chloro-1,1-difluoroethane, HCFC-142b	75-68-3	9.5%	Y

The substance(s) marked with a "Y" in the OSHA column are identified as hazardous chemicals according to the criteria of the OSHA Communication Standard (29 CFR 1910.1200)
This material is classified as hazardous under federal OSHA regulation.
The components of this product are all on the TSCA inventory list.

Hazards Identification

Emergency Overview Colorless liquefied gas with faint ether odor.

WARNING!
Liquid and gas under pressure, overheating and overpressurizing may cause gas release or violent cylinder bursting. May decompose on contact with flames or extremely hot metal surfaces to produce toxic and corrosive products. Vapor reduces oxygen available for breathing and is heavier than air. Harmful if inhaled and may cause heart irregularities, unconsciousness or death. Liquid contact with eyes or skin may cause frostbite.

Potential Health Effects
Skin contact and inhalation are expected to be the primary routes of occupational exposure to this material. As with most liquefied gases, contact with the rapidly volatizing liquid can cause frostbite to any tissue. High vapor concentrations are irritating to the eyes and respiratory tract and may result in central nervous system (CNS) effects such as headache, dizziness, drowsiness and, in severe exposure, loss of consciousness and death. The dense vapor of this material may reduce the available oxygen for breathing. Prolonged exposure to an oxygen-deficient atmosphere may be fatal. Inhalation may cause an increase in the sensitivity of the heart to adrenaline, which could result in irregular or rapid heartbeats. Medical conditions aggravated by exposure to this material include heart disease or compromised heart function.

ICOR International
Making your life easier

First Aid Measures

IF IN EYES, *immediately flush with plenty of water. Get medical attention if irritation persists.*

IF ON SKIN, *flush exposed skin with lukewarm water (not hot), or use other means to warm skin slowly. Get medical attention if frostbitten by liquid or if irritation occurs.*

IF SWALLOWED, *Not applicable - product is a gas at ambient temperatures.*

IF INHALED, *remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention. Do not give adrenaline, epinephrine or similar drugs following exposure to this product.*

Fire Fighting Measures

FIRE AND EXPLOSIVE PROPERTIES:

Auto-Ignition Temperature	*NA*	
Flash Point	*NA-GAS*	*Flash Point Method*
Flammable Limits-Upper	*NA*	

EXTINGUISHING MEDIA*:*
Use extinguishing media appropriate to surrounding fire conditions.

FIRE FIGHTING INSTRUCTIONS:
Stop the flow of gas if possible. Use water spray on person making shut-off. Fire fighters and others who may be exposed to products of combustion should wear full fire fighting turn out gear (full Bunker Gear) and self-contained breathing apparatus (pressure demand NIOSH approved or equivalent). Fire fighting equipment should be thoroughly decontaminated after use.

FIRE AND EXPLOSION HAZARDS:
May decompose on contact with flames or extremely hot metal surfaces to produce toxic and corrosive products. Liquid and gas under pressure, overheating or overpressurizing may cause gas release and/or violent cylinder bursting. Container may explode if heated due to extreme heat or flame.

Accidental Release

SAFEGUARDS (PERSONNEL):
Note: Review FIRE FIGHTING MEASURES and HANDLING (PERSONNEL) sections before proceeding with clean-up.

ACCIDENTAL RELEASE MEASURES:
Ventilate area using forced ventilation, especially in low or enclosed places where heavy vapors might collect. Remove open flames. Use self-contained breathing apparatus (SCBA) on large spills or releases.

Handling and 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 compressed gas cylinders.

Hot Shot R-414B 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.

Exposure Controls / Personal Protection

ENGINEERING CONTROLS:
Investigate engineering techniques to reduce exposures below airborne exposure limits. Provide ventilation if necessary to control exposure levels below airborne limits (see below). If practical, use local mechanical equipment exhaust ventilation at sources of air contamination such as open process equipment.

EYE / FACE PROTECTION:
Where there is potential for eye contact, wear chemical goggles and have eye flushing equipment available.

SKIN PROTECTION:
Wear appropriate chemical resistant protective clothing and chemical resistant gloves to prevent skin contact. Consult glove manufacturer to determine appropriate type glove material for given application. Rinse contaminated skin promptly. Wash contaminated clothing and clean protective equipment before reuse. Wash skin thoroughly after handling.

RESPIRATORY PROTECTION:
Avoid breathing gas. When airborne exposure limits are exceeded (see below), use NIOSH approved respiratory protection equipment appropriate to the material and/or its components (full facepiece recommended). Consult respirator manufacturer to determine appropriate type equipment for a given application. Observe respirator use limitations specified by NIOSH or the manufacturer. For emergency and other conditions where exposure limit may be significantly exceeded, use an approved full face positive-pressure, self-contained breathing apparatus or positive-pressure air line with auxiliary self-contained air supply. Respiratory protection programs must comply with 29 CFR §1910.134.

Airborne Exposure Guidelines for Ingredients

EXPOSURE LIMIT	VALUE	
2- Chloro-1,1,1,2-tetrafluoroethane	WEEL TWA	1000 ppm
Chlorodifluoroethane	ACGIH TWA	1000 ppm 3540 mg/m3
1-Chloro-1,1-difluoroethane, HCFC 142b	WEEL TWA	1000 ppm 4100 mg/m3

- Only those components with exposure limits are printed in this section.
- Skin contact limits designated with a "Y" above have skin contact effect. Air sampling alone is insufficient to accurately quantitate exposure. Measures to prevent significant cutaneous absorption may be required.
- ACGIH Sensitizer designator with a value of "Y" above means that exposure to this material may cause allergic reactions.
- WEEL-AIHA Sensitizer designator with a value of "Y" above means that exposure to this material may cause allergic skin reactions.

Physical and Chemical Properties

APPEARANCE:
Volatile liquid with faint sweet odor.

Physical State:	Gas at ambient temperatures	Freezing Point :	Not Determined
Molecular Weight:	97.5	Vapor Pressure:	107 psia @ 70°F
Chemical Formula	CH3CCIF2, CHCIFCF3, CHCIF2	Vapor Density: (air = 1.0):	3.4
Odor:	Faint ethereal odor	Evaporation Rate:	>1
Specific Gravity (water = 1.1):	1.21 @ 21.1 °C (70°F)	Compared to CC14=1	%
Solubility in Water (weight %):	~~0.15wt% @ 25°C (77°F)	Volatiles:	100
PH:	Neutral	Flash Point:	Not applicable
Boiling Point:	-29.8°F		

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

Stability and Reactivity

CHEMICAL STABILITY STABLE:
Conditions contributing to instability - Thermal decomposition due to exposure to heat (>800 °F) or fire.

CONDITIONS TO AVOID:
Avoid flames, sparks, extremely hot metal, heating elements, pilot lights, static electricity, combustion engines, ignition sources, etc.

INCOMPATIBILITY WITH OTHER MATERIALS:
Avoid contact with strong alkalis or alkaline earth metals, finely powdered metals such as aluminum, magnesium or zinc and strong oxidizers since they may react with or accelerate decomposition of this material.

DECOMPOSITION:
Thermal decomposition products include hydrogen fluoride, hydrogen chloride, carbon monoxide, carbon dioxide and chlorine and possibly carbonyl halides. These materials are toxic and irritating. Contact should be avoided.

Toxicological Information

ANIMAL DATA:

Chlorodifluoromethane (HCFC-22) *Inhalation: 4 hour, LC50, rat 220,000 ppm*

Animal testing indicates this material is a slight eye and skin irritant, but not a skin sensitizer. Ingestion: Long-term exposure caused: No significant toxicological effects. Single exposure to high doses caused: Central nervous system depression. Inactivity or anesthesia. Lung noise. Altered respiratory rate. Histopathological changes of the liver. Cardiac sensitization, a potentially fatal disturbance of heart rhythm associated with a heightened sensitivity to the action of epinephrine. Repeated exposure caused: No significant toxicological effects. Long-term exposure caused: Reduced weight gain. Increased adrenals, kidney, liver, pituitary weight.

ADDITIONAL TOXICOLOGOICAL 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). Animal data show developmental effects only at exposure levels producing other toxic effects in the adult animal. This material is not considered a unique developmental hazard to the conceptus. Reproductive data on male animals show: No change in reproductive performance. 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. This material produces genetic damage in bacterial cell cultures. In mammalian cell cultures and animals, this material has not produced genetic toxicity. In animal testing, this material has not caused permanent genetic damage in reproductive cells of mammals (has not produced heritable genetic damage).

1-Chloro-1, 1 - Difluoroethane (HCFC - 142b) *Inhalation 2 hour LC50: 447,642 ppm in rats*

The compound is untested for skin irritancy, is not an eye irritant, and is untested for animal sensitization. Inhalation: Toxic effects of single inhalation exposures include respiratory irritation, loss of reflexes, and unconsciousness. Cardiac sensitization was seen in dogs exposed to concentrations of 5% and higher. Exposure of dogs or monkeys to concentrations of 5 to 20% for five minutes caused decreased blood pressure (hypotension). Repeated exposure produced only irritation of the lungs. Tests in animals demonstrate no carcinogenic, developmental, or reproductive toxicity. The compound does not produce genetic damage in animals or in bacterial and mammalian cell cultures. It does not Produce heritable genetic damage.

Ethane, 2-Chloro-1,1,1,2 - Tetrafluoro (HCFC - 124) *Inhalation: 4 hour, ALC, rat: 230,000 - 300,000 ppm.*

Single exposure caused: Cardiac sensitization, a potentially fatal disturbance of heart rhythm associated with a heightened sensitivity to the action of epinephrine. Lowest-Observed-Adverse-Effect-Level for cardiac sensitization: 25,000 ppm. Single exposure caused: the following temporary effects - Inactivity or anesthesia. Low blood pressure. Repeated exposure caused: Decrease body weight. Altered clinical chemistry. These effects were reversible. Repeated exposure caused: the following temporary effects - Inactivity or anesthesia. Lethargy. Incoordination. Altered respiratory rate. One study showed: Increased liver weight.

Carcinogenic, Developmental, Reproductive, Mutagenic Effects:

In animal testing this material has not caused carcinogenicity, developmental toxicity. No animal data are available to define the following effects of this material: reproductive toxicity. Tests have shown that this material does not cause genetic damage in bacterial or mammalian cell cultures, or in animals. This material has not been tested for its ability to cause permanent genetic damage in reproductive cells of mammals (not tested for heritable genetic damage).

Ecological Information

ECOTOXICOLOGICAL INFORMATION:

Chlorodifluoromethane

No effects were reported on the growth of aerobic and anaerobic microorganisms over a 24 hour period, including gram-positive and gram-negative species, from exposure to a media containing this material at 5 mg/ml.

1-Chloro-1,1-difluoroethane, HCFC-142b

This material is slightly toxic to freshwater organisms such as rainbow trout (96-hr LC50 36 ppm) and practically non-toxic to guppies (96-hr LC50 220 ppm) and Daphnia magna (48-hr EC50 160->190).

CHEMICAL FATE INFORMATION:

Chlorodifluoroethane

The octano/water partition coefficient (log Pow) was reported to be 1.08.

1-Chloro-1,1-difluoroethane, HCFC-142b

The octano/water partition coefficient (log Pow) for this material was reported to be 1.62.

This material was evaluated with a Modified Strum Test (20-day-5%) and determined to be not readily biodegradable.

2-Chloro-1,1,2-tetrafluoroethane

When released into the environment, this material may be expected to partition almost exclusively into the atmosphere. Based on its low n-octano/water partition coefficient (log Pow 1.9-2.0), bioaccumulation is considered unlikely. In a 28-day ready biodegradability closed bottle test, it appeared to be stable (about 2% degraded).

Disposal Consideration

WASTE DISPOSAL:

Recover, reclaim or recycle when practical. Dispose of in accordance with federal, state, and local regulations.

Note: Chemical additions to, processing of, or otherwise altering this material may make this waste management information incomplete, inaccurate, or otherwise inappropriate. Furthermore, state and local waste disposal requirements may be more restrictive or otherwise different from federal laws and regulations.

Transformation Information

US DOT Hazard Class	*US DOT PROPER SHIPPING NAME: Liquefied gas, n.o.s.* *(Chlorodifluoromethane, Chlorodifluoroethane, Chlorotetrafluoroethane)* *US DOT HAZARD CLASS: 2.2* *US DOT PACKING GROUP: Not applicable*
US DOT ID NUMBER:	*UN3163*

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

Regulatory Information

TOXIC SUBSTANCES CONTROL ACT (TSCA):

TSCA INVENTORY STATUS: *Components listed on the TSCA inventory*

Other TSCA Issues: *HCFC-124 is subject to a SNUR published in the Federal Register on July 22, 1922 at 57 FR32441.*

The SNUR codified at 40 CFR 721.3180(a)(2)(i) requires communication of the following:
Inhalation of high concentrations of vapor is harmful and may cause heart irregularities, unconsciousness, or death. Intentional misuse can be fatal. Vapor reduces oxygen available for breathing and is heavier than air. Liquid contact causes frostbite. The effects in animals from single exposure by inhalation include central nervous 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, anesthesia 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. As part of an extensive toxicology program, halogenated chlorofluorocarbon-124 will be tested in subchronic, developmental and chronic/cancer studies. Avoid breathing high concentrations of vapor. Use with sufficient ventilation to keep employees' exposure below recommended limits. Avoid contact of liquid with skin and eyes. Wear chemical splash goggles and lined butyl gloves. *PAFT studies on HCFC-124 were completed August, 1995. The tests demonstrated very low acute and subchronic inhalation toxicity. HCFC-124 did not exhibit signs of chronic toxicity, nor did it cause any tumors in a lifetime study. It is not a developmental toxicant, nor is it gentoxic.*

SARA TITLE III/CERCLA

"Reportable Quantities": (RQs) and/or "Threshold Planning Quantities" (TPQs) exist for the following ingredients.

INGREDIENT NAME	SARA/CERCLA RQ (lb.)	SARA EHS TPQ (lb.)
No ingredients listed in this section		

Spills or releases resulting in the loss of any ingredient at or above its RQ requires immediate notification to the National 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". CAS numbers and weight percents are found in Section 2.

INGREDIENT NAME	Comment
No ingredients listed in this section	

STATE RIGHT-TO-KNOW

In addition to the ingredients found in Section 2, the following are listed for state right-to-know purposes.

INGREDIENT NAME	Weight%	Comment
No ingredients listed in this section		

Additional Regulatory Information:
Genetron 409A is subject o U.S. Environmental Protection Agency Clean Air Act Regulations at 40 CFR part 82.

Regulatory Information, continued

WARNING:
Do not vent to the atmosphere. To comply with provisions of the U.S. Clean Air Act, any residual must be recovered. Contains Genetron 22, Genetron 142b and Genetron 124, HCFC substances which harm public health and the Environment by destroying ozone in the upper atmosphere. Destruction of the ozone layer can lead to ultraviolet Radiation which, with excess exposure to sunlight, can lead to an increase in skin cancer and eye cataracts.
WHYMIS Classification (Canada) This product has been evaluated in accordance with the hazard criteria of the CPR and MSDS contains all the information required by the CPR.
Foreign Inventory Status: EU ˆ EINECS # 2008719 ˆ HCFC-22 # 2008918 ˆ HCFC ˆ142ba # 2006296 ˆ HCFC ˆ 124

Other Information

Current Issue Date: *January, 2000*
Previous Issue Date: *August, 1999*

CHANGES TO MSDS FROM PREVIOUS ISSUE DATE ARE DUE TO THE FOLLOWING:
Section 1: New company name
Section 16: Modified NFPA and HMIS codes

OTHER INFORMATION *HMIS Classification: Health-1, Flammability-1, Reactivity-0*
NFPA Classification: Health-2, Flammability-1, Reactivity-0 ANSI/ASHRAE 34 Safety Group-A1

REGULATORY STANDARDS:
1.OSHA regulations for compressed gases: 29CFR 1910.101
2.DOT classification per 49 CFR 172.101
Toxicity information per PSFT testing