GALPA

## 1 PRODUCT AND COMPANY IDENTIFICATION

| | |
|---|---|
| Product Name | R- 409A |
| Product Synonym(s) | R-409A, HCFC/HCFC/HCFC-409A |
| Chemical Family | Hydrochlorofluorocarbon Blend |
| Chemical Formula | CHClF2/CHCLFCF3/CH3CClF2 |
| Chemical Name | Chlorodifluoromethane /1-chloro-1,1-difluoroethane /2-chloro-1,1,1,2-tetrafluoroethane |
| EPA Reg Num | |
| Product Use | Refrigerant |

## 2 COMPOSITION / INFORMATION ON INGREDIENTS

| Ingredient Name | CAS RegistryNumber | Typical Wt. % | OSHA |
|---|---|---|---|
| chlorodifluoromethane (HCFC-22) | 75-45-6 | 60% | Y |
| 2-chloro-1,1,1,2-tetrafluoroethane (HCFC-124) | 2837-89-0 | 25% | Y |
| 1-chloro-1,1-difluoroethane (HCFC-142b) | 75-68-3 | 15% | Y |

The substance(s) marked with a "Y" in the OSHA column, are identified as hazardous chemicals according to the criteria of the OSHA Hazard 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.

## 3 HAZARDS IDENTIFICATION

**Emergency Overview**

Colorless liquified 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 volatilizing 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.

## 4 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 occures.

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, epinephrin or similar drugs following exposure to this product.

## 5 FIRE FIGHTING MEASURES

**Fire and Explosive Properties**

| | | |
|---|---|---|
| Auto-Ignition Temperature | NE | |
| Flash Point | NA - GAS | Flash Point Method |
| Flammable Limits- Upper | NONE | |
| Lower | NONE | |

**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 resulting pressure rise. Some mixtures of HCFCs and/or HFCs, and air or oxygen may be combustible if pressurized and exposed to extreme heat or flame.

## 6 ACCIDENTAL RELEASE MEASURES

**In Case of Spill or Leak**

Use Halogen leak detector or other suitable means to locate leaks or check atmosphere. Keep upwind. Evacuate enclosed spaces and disperse gas with floor-level forced-air ventilation. Exhaust vapors outdoors. Do not smoke or operate internal combustion engines. Remove flames and heating elements.

## 7 HANDLING AND STORAGE

**Handling**

Avoid breathing gas. Avoid contact with eyes, skin and clothing. Keep container closed. Use only with adequate ventilation. Do not enter confined spaces unless adequately ventilated.

**Storage**

Do not apply direct flame to cylinder. Do not store cylinder in direct sun or expose it to heat above 120 F. Do not drop or refill this cylinder. Keep away from heat, sparks and flames.

## 8 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 exposure limits (see below). If practical, use local mechanical 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 airline 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 (HCFC-124)** | | |
| WEEL TWA | - | 1000 ppm |
| **chlorodifluoromethane (HCFC-22)** | | |
| 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.

## 9 PHYSICAL AND CHEMICAL PROPERTIES

| | |
|---|---|
| Appearance/Odor | Colorless liquified gas with faint ether odor. |
| pH | NA |
| Specific Gravity | 1.21 @ 25 C |
| Vapor Pressure | (BUBBLE) 104.2 PSIA @ 21.1 C (70 F) |
| Vapor Density | (AIR = 1) 3.38 |
| Melting Point | NE |
| Freezing Point | NE |
| Boiling Point | -31 F |
| Solubility In Water | Negligible |
| Percent Volatile | 100 |
| Molecular Weight | 97.43 |

## 10 STABILITY AND REACTIVITY

**Stability**

This material is chemically stable under specified conditions or storage, shipment and/or use. See HANDLING AND STORAGE section of this MSDS for specified conditions.

**Incompatibility**

Avoid contact with strong alkali or alkaline earth metals, finely powdered metals such as aluminum, magnesium or zinc and strong oxidizers, since they may react or accelerate decomposition.

**Hazardous Decomposition Products**

Thermal decomposition products could include Halogen acids (HCl and HF), Halogens, Carbon Monoxide, Carbon Dioxide, and Carbon Halides.

## 11 TOXICOLOGICAL INFORMATION

**Toxicological Information**

Chlorodifluoromethane

Several accidental deaths have been associated with exposure to this material or mixtures with other fluorocarbons. Death was generally attributed to oxygen deficiency. Microscopic examination of the tissues of some of the victims showed effects on the lungs and fatty deposits in liver cells. An increase in the incidence of heart palpitations has been claimed by individuals occupationally exposed. Monitoring of workers during occupational exposure showed no connection to exposure and cardiac arrhythmia or neurologic disorders. Other epidemiological studies have reported similar results. Repeated skin application of a 10 second spray caused reddening and slight swelling of the skin and a delay in hair growth.

No skin allergy was observed in guinea pigs following repeated exposure. Studies with mice, dogs, rats, rabbits, cats and monkeys have shown that inhalation exposure can cause cardiac arrhythmias. Inhalation causes an initial stimulation and then depression of the central nervous system (CNS). Symptoms in animals include loss of equilibrium, tremors, convulsions and narcosis and death, usually attributed to asphyxiation. At levels that caused anesthesia, dogs exhibited convulsions. Acute exposure by inhalation was fatal to rabbits, also causing hemorrhages and effects on the liver. Following repeated inhalation exposure, no effects were reported in guinea pigs, dogs and cats; mild liver effects were reported in rabbits; and, effects on the lungs, CNS, heart, liver, kidney, spleen were reported in rats, mice and rabbits. An increase in malignant tumors of the salivary glands was reported in male rats but not in female rats or mice of either sex after long-term inhalation exposure. Long-term oral dosing produced no adverse effects in rats. Inhalation exposure produced no adverse effects on male reproductive performance in rats and mice. Eye malformations were reported in the offspring of rats exposed by inhalation during pregnancy. In rabbits, rats and humans, a small portion of inhaled material was

## 11 TOXICOLOGICAL INFORMATION

distributed into the brain, heart, lungs, liver, kidneys and fat. It was rapidly eliminated from the body in the inhaled air. No significant metabolism occurs in humans or rats. The results of the tests for genetic changes were mixed. Single exposure (acute) studies indicate:
Inhalation - Practically Non-toxic to Rats (2 hr-LC50 300,000 ppm)
Eye Irritation - Slightly Irritating to Rabbits (5-30 sec. exposure to gas spray)
Skin Irritation - Moderately Irritating to Rabbits (liquefied gas with patch applied)

1-Chloro-1,1-difluoroethane, HCFC-142b
Inhalation exposure can cause cardiac arrhythmias and effects on the cardiac and respiratory system in dogs. Dogs treated with adrenalin then exposed by inhalation exhibited cardiac sensitization. Inhalation exposure causes an initial stimulation and then depression of the central nervous system. Symptoms in animals include loss of equilibrium, tremors, convulsions and narcosis. Death was usually attributed to respiratory failure and animals that died from inhalation exposure generally showed lung irritation. Following repeated inhalation exposure, effects on the lungs were noted in rats. No birth defects were noted in rats exposed by inhalation during pregnancy. The results of tests for genetic changes were mixed. Following repeated inhalation exposure, no increases in urinary fluoride was reported and this material was not detected in tissues. Single exposure (acute) studies indicate:
Inhalation - Practically Non-toxic to Rats (6-hr LC50 >200,000 ppm)
Eye Irritation -Slightly Irritating to Rabbits (dry ice cooled liquid)

2-Chloro-1,1,1,2-tetrafluoroethane
Acute inhalation of high concentrations has produced a rapid anesthetic effect in mice and dogs. Inhalation , followed by intravenous injection of epinephrine to simulate stress reactions, resulted in cardiac sensitization in dogs. Following repeated inhalation exposure, drowsiness and loss of coordination were observed in rats (at high dose levels) and slight central nervous system effects and minor blood chemistry changes were observed in rats and mice. Long-term inhalation produced no increased incidence of tumors in rats. No birth defects were noted in the offspring of rats or rabbits exposed by inhalation during pregnancy, even at dosages which produced adverse effects in the mother. No genetic changes were observed in tests using bacteria, animal cells or animals. Single exposure (acute) studies indicate:
Inhalation - Practically Non-toxic to Rats (4-hr LC50 230,000 to 300,000 ppm)

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## 12 ECOLOGICAL INFORMATION

**Ecotoxicological Information**

Chlorodifluoromethane
The toxicity threshold for fish is 180 mg/l (24-hrs) and for bacteria under anaerobic conditions is >400 mg/l (24-hrs). 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 that contained this material at 5 mg/ml.

1-Chloro-1,1-difluoroethane, HCFC-142b
This material is slightly toxic 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 mg/l).

**Chemical Fate Information**

Chlorodifluoromethane
This material is not readily biodegradable (0% after 28-days) and is practically not bioaccumulable (log Pow 1.08). In air, it has a half-life in the atmosphere of 8.4 years, an ozone depletion potential (ODP) of 0.055, and a halocarbon global warming potential (HGWP) of 0.33. It is moderately adsorbed in soils and sediments (log Koc 1.8).

1-Chloro-1,1-difluoroethane, HCFC-142b
This material is not readily biodegradable (5% after 20-days) and is practically not bioaccumulable (log Pow 1.64-2.05). In air, it has a half-life in the atmosphere of 12.8 years, an ozone depletion potential (ODP) of 0.065,

a halocarbon global warming potential (HGWP) of 0.42, and a global warming potential with respect to CO2 of 1800.

2-Chloro-1,1,1,2-tetrafluoroethane
When released into the environment, this material may be expected to partition almost exclusively into the atmosphere. Bioaccumulation is considered unlikely (log Pow 1.9-2.0). This material is not readily biodegradable (2% after 28-days)..

## 13 DISPOSAL CONSIDERATIONS

**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.

## 14 TRANSPORT INFORMATION

| | |
|---|---|
| DOT Name | Liquefied Gas, NOS |
| DOT Technical Name | (Chlorodifluoromethane, Chlorodifluoroethane) |
| DOT Hazard Class | 2.2 |
| UN Number | UN 3163 |
| DOT Packing Group | PG NA |
| RQ | |

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## 15 REGULATORY INFORMATION

**Hazard Categories Under Criteria of SARA Title III Rules (40 CFR Part 370)**

| | | | |
|---|---|---|---|
| Immediate (Acute) Health | Y | Fire | N |
| Delayed (Chronic) Health | N | Reactive | N |
| | | Sudden Release of Pressure | Y |

The components of this product are all on the TSCA Inventory list.

**Ingredient Related Regulatory Information:**

| **SARA Reportable Quantities** | CERCLA RQ | SARA TPQ |
|---|---|---|
| 2-chloro-1,1,1,2-tetrafluoroethane (HCFC-124) | NE | |
| chlorodifluoromethane (HCFC-22) | NE | |
| 1-chloro-1,1-difluoroethane (HCFC-142b) | 100 LBS | |

**SARA Title III, Section 313**

This product does contain chemical(s) which are defined as toxic chemicals under and subject to the reporting requirements of, Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR Part 372. See Section 2

1-chloro-1,1-difluoroethane (HCFC-142b)
2-chloro-1,1,1,2-tetrafluoroethane (HCFC-124)
chlorodifluoromethane (HCFC-22)

**Massachusetts Right to Know**

This product does contain the following chemicals(s), as indicated below, currently on the Massachusetts Right to Know Substance List.

1-chloro-1,1-difluoroethane (HCFC-142b)
chlorodifluoromethane (HCFC-22)

**New Jersey Right to Know**

This product does contain the following chemical(s), as indicated below, currently on the New Jersey Right-to-Know Substances List.

1-chloro-1,1-difluoroethane (HCFC-142b)
2-chloro-1,1,1,2-tetrafluoroethane (HCFC-124)
chlorodifluoromethane (HCFC-22)

**Pennsylvania Environmental Hazard**

This product does contain the following chemical(s), as indicated below, currently on the Pennsylvania Environmental Hazard List.

chlorodifluoromethane (HCFC-22)

**Pennsylvania Right to Know**

This product does contain the following chemical(s), as indicated below, currently on the Pennsylvania Hazardous Substance List.

1-chloro-1,1-difluoroethane (HCFC-142b)
chlorodifluoromethane (HCFC-22)

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