



## 1 PRODUCT AND COMPANY IDENTIFICATION

**DFO**  
2000 Market Street

Philadelphia, PA 19103

Information Telephone Numbers

Product Information

Product Name Forane (R) 408A  
Product Synonym(s) R-408A, HFC/HFC/HCFC-408A, FORANE FX 10

Chemical Family Hydrofluorocarbon/ Hydrochlorofluorocarbon Blend  
Chemical Formula CHClF<sub>2</sub>/CHF<sub>2</sub>CF<sub>3</sub>/CH<sub>3</sub>CF<sub>3</sub>  
Chemical Name chlorodifluoromethane / pentafluoroethane /1,1,1-trifluoroethane  
EPA Reg Num  
Product Use Refrigerant Blend

**EMERGENCY PHONE NUMBERS:**  
Chemtrec: (800) 424-9300 (24hrs) or (703) 527-3887  
Medical: Rocky Mountain Poison Control Center  
(866) 767-5089 (24Hrs)

Phone Number

Available Hrs

800-245-5858

8:00 am - 5:30 pm (Eastern)

## 2 COMPOSITION / INFORMATION ON INGREDIENTS

Ingredient Name	CAS RegistryNumber	Typical Wt. %	OSHA
chlorodifluoromethane (HCFC-22)	75-45-6	47%	Y
1,1,1-trifluoroethane (HFC-143a)	420-46-2	46%	Y
pentafluoroethane (HFC-125)	354-33-6	7%	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 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, 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**

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**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
<b>chlorodifluoromethane (HCFC-22)</b>	
ACGIH TWA	- 1000 ppm 3540 mg/m3
<b>pentafluoroethane (HFC-125)</b>	
WEEL TWA	- 4900 mg/m3 1000 ppm
<b>1,1,1-trifluoroethane (HFC-143a)</b>	
WEEL TWA	- 3400 mg/m3 1000 ppm

- 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	1.06 @ 25 C
Vapor Pressure	(BUBBLE) 151.5 PSIA @ 21.1 C (70 F)
Vapor Density	(AIR = 1) 3.02
Melting Point	NE
Freezing Point	NE
Boiling Point	-43.5 C/ -46.3 F
Solubility In Water	Slight
Percent Volatile	100
Molecular Weight	87.01

## 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 Carbonyl 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

## 11 TOXICOLOGICAL INFORMATION

exposed by inhalation during pregnancy. In rabbits, rats and humans, a small portion of inhaled material was 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)

Ethane, 1,1,1-trifluoro-

Inhalation of high concentrations of this material, followed by intravenous injection of epinephrine to simulate stress reactions, resulted in cardiac sensitization in dogs. Following repeated inhalation exposure, lung irritant effects including mild bronchitis and pneumonia were observed in rats and guinea pigs. No adverse effects were observed in long-term oral studies with rats. No birth defects were noted in the offspring of rats or rabbits exposed by inhalation during pregnancy. No genetic changes were observed in tests using animal cells or animals. Both positive and negative results have been reported in tests using bacteria. Single exposure (acute) studies indicate:

Inhalation - Practically Non-toxic to Rats (4-hr LC50 >540,000 ppm)

Ethane, pentafluoro-

Inhalation followed by intravenous injection of epinephrine to simulate stress reactions resulted in cardiac sensitization in dogs. Following repeated inhalation exposure, no adverse effects were observed in rats. No birth defects were noted in the offspring of rats or rabbits exposed by inhalation during pregnancy. 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 >800,000 ppm)

## 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. Ethane, 1,1,1-trifluoro-

This material is practically non-toxic to *Daphnia magna* (48-hr LC50 300 mg/l) and no more than slightly toxic to rainbow trout (96-hr LC50 >40 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).

Ethane, pentafluoro-

When released into the environment, this material is expected to partition almost exclusively into the atmosphere. Based on its low n-octanol/water partition coefficient (log Pow 1.48), bioaccumulation is considered unlikely. In a 28-day ready biodegradability closed bottle test, it appeared to be stable (about 10% degraded). This material does not dissociate in water.



**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, Trifluoroethane)  
 DOT Hazard Class 2.2  
 UN Number UN 3163  
 DOT Packing Group PG NA  
 RQ

**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:**

<b>SARA Reportable Quantities</b>	<b>CERCLA RQ</b>	<b>SARA TPQ</b>
chlorodifluoromethane (HCFC-22)	NE	

**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

chlorodifluoromethane (HCFC-22)

**Massachusetts Right to Know**

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

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.

1,1,1-trifluoroethane (HFC-143a)  
 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.

chlorodifluoromethane (HCFC-22)



**16 OTHER INFORMATION**

**Revision Information**

Revision Date 11 OCT 2004 Revision Number 7

Supercedes Revision Dated 31-MAR-2003

**Revision Summary**

A TOFINA Chemicals, Inc. has changed its name to Arkema Inc.

**Key**

NE= Not Established NA= Not Applicable (R) = Registered Trademark

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