



## 1 PRODUCT AND COMPANY IDENTIFICATION

### Fluorochemicals

Arkema Inc.  
2000 Market Street  
Philadelphia, PA 19103

### EMERGENCY PHONE NUMBERS:

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

Information Telephone Numbers	Phone Number	Available Hrs
Product Information	800-245-5858	8:00 am - 5:30 pm (Eastern)

Product Name	Forane (R) 427A
Product Synonym(s)	R-427A, HFC-427A, FX 100
Chemical Family	HFC Blend
Chemical Formula	CH <sub>2</sub> F <sub>2</sub> /CHF <sub>2</sub> CF <sub>3</sub> /CH <sub>3</sub> CF <sub>3</sub> /CH <sub>2</sub> FCF <sub>3</sub>
Chemical Name	difluoromethane/pentafluoroethane/1,1,1-trifluoroethane/1,1,1,2-tetrafluoroethane
EPA Reg Num	
Product Use	Refrigerant Blend

## 2 COMPOSITION / INFORMATION ON INGREDIENTS

Ingredient Name	CAS RegistryNumber	Typical %	OSHA
difluoromethane (HFC-32)	75-10-5	15% By Wt.	Y
pentafluoroethane (HFC-125)	354-33-6	25% By Wt.	Y
1,1,1-trifluoroethane (HFC-143a)	420-46-2	10% By Wt.	Y
1,1,1,2-tetrafluoroethane (HFC-134a)	811-97-2	50% By Wt.	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

Clear, colorless liquified gas with faint ethereal (ether like) 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	NA	
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>1,1,1,2-tetrafluoroethane (HFC-134a)</b>	
WEEL TWA -	4240 mg/m3 1000 ppm
<b>perfluoroethane (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
<b>difluoromethane (HFC-32)</b>	
WEEL TWA -	2200 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	Clear, colorless liquified gas with faint ethereal (ether like) odor.
pH	NA
Specific Gravity	1.17
Vapor Pressure	155.7 psia @ 20 C (68 F)
Vapor Density	NE
Melting Point	NE
Freezing Point	NE
Boiling Point	-42.7C<T<-35.5C
Solubility In Water	NE

## 10 STABILITY AND REACTIVITY

### Stability

This material is chemically stable under normal and anticipated storage and handling conditions.

### Incompatibility

Avoid contact with flames and red hot metallic surfaces.

### Hazardous Decomposition Products

Thermal decomposition into toxic products containing fluorine, Hydrogen fluoride (hydrofluoric acid), Carbon oxides.

## 11 TOXICOLOGICAL INFORMATION

### Toxicological Information

Data on this material and/or its components are summarized below.

#### Ethane, pentafluoro-

Single exposure (acute) studies indicate that this material is practically non-toxic if inhaled (rat 4-hr LC50 >800,000 ppm). 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.

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

Single exposure (acute) studies indicate that this material is practically non-toxic if inhaled (rat 4-hr LC50 >540,000 ppm). 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.

#### Methane, difluoro-

Single exposure (acute) studies indicate that this material is practically non-toxic if inhaled (rat 4-hr LC50 >520,000 ppm). Inhalation of this material, followed by intravenous injection of epinephrine to simulate stress reactions, resulted in cardiac sensitization in dogs. Acute inhalation of high concentrations has produced an anesthetic effect in rats. 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, even at

## 11 TOXICOLOGICAL INFORMATION

dosages which produced significant adverse effects in the mother. No genetic changes were observed in tests using bacteria, animal cells or animals.

### 1,1,1,2-Tetrafluoroethane (HFC-134a)

Single exposure (acute) studies indicate that this material is practically non-toxic if inhaled (rat 4-hr LC50 >500,000 ppm; 30-min LC50 ~750,000 ppm) and slightly irritating to rabbit eyes and skin (24-hr exposure). No skin allergy was observed in guinea pigs following repeated exposure. Acute inhalation exposure produced anesthetic effects in mice, dogs, cats and monkeys. Repeated inhalation exposure produced no adverse effects in rats. Inhalation, followed by intravenous injection of epinephrine to simulate stress reactions, resulted in cardiac sensitization in dogs. Following long-term inhalation studies in rats, an increased incidence of benign tumors (at high concentrations) in the testes was observed. No birth defects were noted in the offspring of rats exposed by inhalation during pregnancy, even at dosages that produced significant adverse effects in the mother. No genetic changes were observed in tests using bacteria, animal cells or animals.

## 12 ECOLOGICAL INFORMATION

### Ecotoxicological Information

Data on this material and/or its components are summarized below.

#### 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).

#### 1,1,1,2-Tetrafluoroethane (HFC-134a)

This material is practically non-toxic to *Daphnia magna* (48-hr EC50 930 mg/l), rainbow trout (96-hr LC50 450 mg/l) and bacteria (16-hr EC10 >730 mg/l).

### Chemical Fate Information

Data on this material and/or its components are summarized below.

#### 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.

#### Methane, difluoro-

The log Pow for this material is 1.62 indicating a low bioconcentration factor. In a 28-day ready biodegradability closed bottle test, this material appeared to be stable.

#### 1,1,1,2-Tetrafluoroethane (HFC-134a)

This material is not readily biodegradable (3% after 28-days). Its degradation half-life in the atmosphere is 9.6-16.7 years. The ozone depletion potential (ODP) is 0 and the halocarbon global warming potential (HGWP) is 0.3. It is practically not bioaccumulable (log Pow 1.06).

## 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 (1,1,1,2 - tetrafluoroethane, pentafluoroethane)  
 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>	<u>CERCLA RQ</u>	<u>SARA TPQ</u>
1,1,1,2-tetrafluoroethane (HFC-134a)	NE	

**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)
- difluoromethane (HFC-32)

**Pennsylvania Environmental Hazard**

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

- difluoromethane (HFC-32)

**Pennsylvania Right to Know**

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

- difluoromethane (HFC-32)

**16 OTHER INFORMATION**

**Revision Information**

Revision Date 23 FEB 2007 Revision Number 8  
 Supersedes Revision Dated 21-FEB-2007

**Revision Summary**

Changed boiling point in section 9

**Key**

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



**Forane (R) 427A**  
Material Safety Data Sheet

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