

**1 PRODUCT AND COMPANY IDENTIFICATION****Fluorochemicals Group**  
2000 Market Street

Philadelphia, PA 19103

Information Telephone Numbers

Product Information

Product Name Forane (R) 500  
Product Synonym(s)Chemical Family Hydrochlorofluorocarbon and Hydrofluorocarbon Blend  
Chemical Formula Mixture  
Chemical Name Dichlorodifluoromethane (CFC-12) and Difluoroethane (HFC-152a)  
EPA Reg Num  
Product Use Refrigerant

EMERGENCY PHONE NUMBERS:

Chemtrec: (800) 424-9300 (24hrs) or (703) 527-3887  
Medical: Rocky Mountain Poison Control Center  
(303) 623-5716 (24Hrs)

Phone Number

800-245-5858

Available Hrs

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

**2 COMPOSITION / INFORMATION ON INGREDIENTS**

Ingredient Name	CAS RegistryNumber	Typical Wt. %	OSHA
Dichlorodifluoromethane (R-12)	75-71-8	73.8%	Y
Difluoroethane, R-152A	75-37-6	26.2%	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.

**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 liquified 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	NA	
Lower	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 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

**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
<b>Dichlorodifluoromethane (R-12)</b>	
ACGIH TWA	1000 ppm 4950 mg/m <sup>3</sup>
OSHA TWA PEL	1000 ppm 4950 mg/m <sup>3</sup>
<b>Difluoroethane, R-152A</b>	
WEEL TWA	2700 mg/m <sup>3</sup> (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	1.14 @ 4 C
Vapor Pressure	100.1 PSIA @ 70 F
Vapor Density	3.42
Melting Point	NA
Freezing Point	-159 C / -254 F
Boiling Point	-33.5 C / -28.3 F
Solubility In Water	Slight
Percent Volatile	100
Molecular Weight	99.3
Bulk Density	1.14 @ 25 C (g/cm3)

**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 include hydrogen fluoride, hydrogen chloride, carbon monoxide, carbon dioxide and chlorine.

**11 TOXICOLOGICAL INFORMATION****Toxicological Information****Dichlorodifluoromethane**

No adverse effects were reported in human volunteers following inhalation of 1000 ppm for 1-60 minutes, while inhalation of 10,000 ppm for 2.5 hours resulted in a 7% reduction in psychological performance. Individuals exposed for a short time (14-18 minutes) to a high concentration (40,000 ppm) reported a tingling sensation, humming in the ears, electrocardiogram changes, a feeling of apprehension, decreased psychological test scores and slurred speech. Exposure to 110,000 ppm for 10 minutes caused partial loss of consciousness with amnesia and heart arrhythmia in one individual.

Repeated spraying of a 40% solution of this material in sesame oil daily for 12 applications had no effect on skin of rabbits. This material sprayed directly on the skin, tongue, soft palate and in the ear canal of rats, 1-2 times per day, for 5-6 weeks showed only evidence of slight skin irritation. A number of acute studies with dogs, rats, mice, rabbits and monkeys have shown that inhalation exposure to high levels of this material caused anesthesia, heart arrhythmia, reduced heart function, effects on blood pressure, heart sensitization to adrenaline and other effects on the heart and respiratory systems in most animal species. Subacute inhalation studies have shown few adverse effects. No pathologic changes were reported in guinea pigs, rats, cats and

**11 TOXICOLOGICAL INFORMATION**

dogs following inhalation of 100,000 ppm of this material for 4-weeks. In longer-term (13-week) inhalation studies, liver changes occurred in guinea pigs at 4000 ppm, while 810 ppm was without effect in dogs, monkeys, rats or rabbits, but guinea pigs showed microscopic liver injury. Inhalation of very high concentrations (100,000 ppm) for similar time periods (10-12 weeks) produced tremors, signs of mild narcosis and some blood changes in guinea pigs, dogs and monkeys. Following oral dosing of rats and dogs with this material at 160-379 mg/kg/day and 84-95 mg/kg/day, respectively, for about 12 weeks, no adverse effects were reported. No adverse effects were reported in dogs following long-term (2-year) dietary administration of this material at levels up to 80 mg/kg/day. Reduced body weight gain in female rats was the only effect reported with long-term oral dosing (2-years) of rats at levels up to 150 mg/kg/day. Long-term oral dosing at higher dosages (1000 mg/kg/day to rats and 3925 mg/kg/day to mice) reduced animal survival. This material produced no tumors in any of these studies. No birth defects or embryotoxicity were noted in rats given this material orally during pregnancy at levels up to 170 mg/kg/day. No birth defects were noted in rats or rabbits exposed to a mixture of 90% of this material and 10% trichlorofluoromethane by inhalation during pregnancy at a concentration of 200,000 ppm. No effects were seen on the ability of male or female rats to reproduce when given this material in corn oil orally at levels up to 150 mg/kg/day for 3 successive generations. This material produced no genetic changes in standard tests using animals and animal or bacterial cells. This material diffuses rapidly into the blood and is rapidly eliminated almost completely from the lungs by exhaled air. Human volunteers eliminated about 90% of inhaled this material within 30 minutes after inhalation of a single breath of the material. Single exposure (acute) studies indicate:

Oral - No More Than Slightly Toxic to Rats (LD50 > 1,000 mg/kg)

Inhalation - Practically Non-toxic to Mice (3-hr LC50 620,000 ppm)

Inhalation - Practically Non-toxic to Rats (30-min LC50 > 800,000 ppm)

**Difluoroethane, R-152A**

Studies of workers exposed in industry operations did not indicate that this material causes heart arrhythmias. Acute inhalation exposure produced signs of sedation and heart arrhythmias in rats, but no adverse effects were observed in mice or monkeys. Rats did not exhibit increased sensitivity to the cardiac effects after chemically-induced heart injury, but did show an increased sensitivity after chemically-induced injury to lung arteries. Inhalation, followed by intravenous injection of epinephrine to simulate stress reactions, resulted in cardiac sensitization in dogs. Following repeated inhalation exposure, respiratory irritation, sedation and an increase in urinary excretion of fluoride were observed in rats. Effects on nasal tissue and reversible kidney changes were observed in rats following long-term inhalation exposure studies. This material did not increase the incidence of tumors in long-term inhalation studies in rats. No birth defects were noted in the offspring of rats exposed by inhalation during pregnancy. No genetic changes were observed in a test using bacteria. Single exposure (acute) studies indicate

Inhalation - Practically Non-Toxic to Rats (4-hr LC50 383,000 ppm)

**12 ECOLOGICAL INFORMATION****Ecotoxicological Information**

No data are available.

**Chemical Fate Information**

Dichlorodifluoromethane (CFC 12)

This material is biodegradable in anaerobic environments. The log octanol/water partition coefficient is 2.08-2.16.

<b>13 DISPOSAL CONSIDERATIONS</b>
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**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.

<b>14 TRANSPORT INFORMATION</b>
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DOT Name	Dichlorodifluoromethane and Difluoroethane Azeotropic Mixture
DOT Technical Name	(R-500)
DOT Hazard Class	2.2
UN Number	UN 2602
DOT Packing Group	PG NA
RQ	

<b>15 REGULATORY INFORMATION</b>
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**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>	CERCLA RQ	SARA TPQ
Dichlorodifluoromethane (R-12)	5000 LBS	_____
Difluoroethane, R-152A	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 Ammendments and Reauthorization Act of 986 and 40 CFR Part 372. See Section 2

Dichlorodifluoromethane (R-12)

**Massachusetts Right to Know**

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

Dichlorodifluoromethane (R-12)  
 Difluoroethane, R-152A

**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.

Dichlorodifluoromethane (R-12)  
 Difluoroethane, R-152A

**Pennsylvania Environmental Hazard**

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

**Pennsylvania Environmental Hazard**

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

Dichlorodifluoromethane (R-12)

**Pennsylvania Right to Know**

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

Dichlorodifluoromethane (R-12)

**16 OTHER INFORMATION****Revision Information**

Revision Date	20 SEP 2001	Revision Number	4
Supercedes Revision Dated	13-JUL-2000		

**Revision Summary**

Revised section 9.

**Key**

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

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