



## FORANE® 22

### 1. PRODUCT AND COMPANY IDENTIFICATION

#### Company

Arkema Inc.  
2000 Market Street  
Philadelphia, Pennsylvania 19103

#### Fluorochemicals

**Customer Service Telephone Number:** (800) 245-5858  
(Monday through Friday, 8:30 AM to 5:30 PM EST)

#### Emergency Information

**Transportation:** CHEMTREC: (800) 424-9300  
(24 hrs., 7 days a week)  
**Medical:** Rocky Mountain Poison Center: (303) 623-5716  
(24 hrs., 7 days a week)

#### Product Information

**Product name:** FORANE® 22  
**Synonyms:** R-22, HCFC-22  
**Molecular formula:** CHClF<sub>2</sub>  
**Chemical family:** Hydrochlorofluorocarbon  
**Product use:** Low temperature refrigerant, Air conditioning

### 2. HAZARDS IDENTIFICATION

#### Emergency Overview

**Color:** Clear - colourless  
**Physical state:** gas  
**Form:** Liquefied gas  
**Odor:** Ether-like (slightly)

**CAUTION!**  
**HIGH PRESSURE GAS.**  
**LIQUID AND GAS UNDER PRESSURE.**  
**OVERHEATING OR 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.**  
**MAY CAUSE EYE AND RESPIRATORY TRACT IRRITATION.**  
**PROLONGED OR REPEATED CONTACT MAY DRY SKIN AND CAUSE IRRITATION.**  
**MAY CAUSE FROSTBITE.**  
**MAY CAUSE HEADACHE, NAUSEA, DIZZINESS, DROWSINESS, LOSS OF CONSCIOUSNESS.**  
**MAY CAUSE EFFECTS ON:**  
**HEART**

**Potential Health Effects****Primary routes of exposure:**

Inhalation and skin contact.

**Signs and symptoms of acute exposure:**

Liquid: Rapid evaporation of the liquid may cause frostbite. Prolonged or repeated skin contact may cause defatting resulting in drying, redness and rash. (severity of effects depends on extent of exposure) Vapor: May cause eye irritation. Vapor is heavier than air and can cause suffocation by reducing oxygen available for breathing. May cause irritation of respiratory tract. Central nervous system effects: headache, nausea, dizziness, drowsiness, loss of consciousness. Stress induced heart effects: rapid heart beat, irregular heart beat, (severity of effects depends on extent of exposure).

**Skin:**

Moderately irritating. May cause frostbite. (based on animal studies)

**Inhalation:**

Practically nontoxic. (based on animal studies)

**Eyes:**

Slightly irritating. (based on animal studies)

**Medical conditions aggravated by overexposure:**

Heart disease or compromised heart function.

**3. COMPOSITION/INFORMATION ON INGREDIENTS**

Chemical Name	CAS-No.	Wt/Wt	OSHA Hazardous
Methane, chlorodifluoro-	75-45-6	100 %	Y

The substance(s) marked with a "Y" in the Hazard column above, are those identified as hazardous chemicals under the criteria of the OSHA Hazard Communication Standard (29 CFR 1910.1200).

This material is classified as hazardous under Federal OSHA regulation.

**4. FIRST AID MEASURES****Inhalation:**

If inhaled, remove victim to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

**Skin:**

If on skin, flush exposed skin with lukewarm water (not hot), or use other means to warm skin slowly. Remove contaminated clothing and shoes. Get medical attention if frostbitten by liquid or if irritation occurs. Wash clothing before reuse. Thoroughly clean shoes before reuse.

**Eyes:**

Immediately flush eye(s) with plenty of water. Get medical attention if irritation persists.

**Ingestion:**

Ingestion is not applicable - product is a gas at ambient temperatures.

**Notes to physician:**

Do not give drugs from adrenaline-ephedrine group.

**5. FIRE-FIGHTING MEASURES**

<b>Flash point</b>	Not applicable
<b>Auto-ignition temperature:</b>	1,170 °F (632 °C)
<b>Lower flammable limit (LFL):</b>	None.
<b>Upper flammable limit (UFL):</b>	None.

**Extinguishing media (suitable):**

Use extinguishing measures to suit surroundings.

**Protective equipment:**

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.

**Further firefighting advice:**

Keep containers cool by spraying with water if exposed to fire.  
Water mist should be used to reduce vapor concentrations in air.

**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.

When burned, the following hazardous products of combustion can occur:

Hydrogen fluoride  
hydrogen chloride  
Carbon oxides

**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. Do not smoke or operate internal combustion engines. Remove flames and heating elements. Stop the leak if you can do so without risk. Sources of ignition should be kept well clear. Consult a regulatory specialist to determine appropriate state or local reporting requirements, for assistance in waste characterization and/or hazardous waste disposal and other requirements listed in pertinent environmental permits.

**7. HANDLING AND STORAGE****Handling****General information on handling:**

Avoid contact with skin, eyes and clothing.  
Avoid breathing gas.  
Keep container closed.  
Use only with adequate ventilation.  
Wash thoroughly after handling.  
Do not enter confined spaces unless adequately ventilated.  
Use equipment rated for cylinder pressure.  
Use a backflow preventative device in piping.  
Close valve after each use and when empty.  
Emptied container retains vapor and product residue.  
Observe all labeled safeguards until container is cleaned, reconditioned or destroyed.

**Storage****General information on storage conditions:**

Store in well ventilated area away from heat and sources of ignition such as flame, sparks and static electricity.

**Storage stability – Remarks:**

Do not apply direct flame to cylinder. Do not store cylinder in direct sun or expose it to heat above 120 F (48.9 C.).  
Do not drop or refill this cylinder.

**Storage incompatibility – General:**

Keep away from oxidising agents and strongly acid or alkaline materials.

**8. EXPOSURE CONTROLS/PERSONAL PROTECTION****Airborne Exposure Guidelines:****Methane, chlorodifluoro- (75-45-6)**

US. ACGIH Threshold Limit Values

Time Weighted Average (TWA): 1,000 ppm

Only those components with exposure limits are printed in this section. Limits with skin contact designation above have skin contact effect. Air sampling alone is insufficient to accurately quantitate exposure. Measures to prevent significant cutaneous absorption may be required. Limits with a sensitizer designation above mean that exposure to this material may cause allergic reactions.

**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 above). If practical, use local mechanical exhaust ventilation at sources of air contamination such as open process equipment.

**Respiratory protection:**

Avoid breathing gas. Where airborne exposure is likely or airborne exposure limits are exceeded (if applicable, see above), 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 there may be a potential for significant exposure or 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.

**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 immediately if skin is contaminated. Wash contaminated clothing and clean protective equipment before reuse. Wash thoroughly after handling.

**Eye protection:**

Where eye contact may be likely, wear chemical goggles and have eye flushing equipment available.

**9. PHYSICAL AND CHEMICAL PROPERTIES**

<b>Color:</b>	Clear - colourless
<b>Physical state:</b>	gas
<b>Form:</b>	Liquefied gas
<b>Odor:</b>	Ether-like (slightly)
<b>pH:</b>	Not applicable
<b>Density:</b>	1.19 g/cm <sup>3</sup> (77 °F (25 °C))
<b>Vapor pressure:</b>	7,033 mmHg (77 °F (25 °C))
<b>Vapor density:</b>	3.00 kg/m <sup>3</sup>
<b>Solubility in water:</b>	slightly soluble

**10. STABILITY AND REACTIVITY****Stability:**

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

**Materials to avoid:**

Strong oxidizing agents  
Strong acids  
Alkaline materials

**Conditions / hazards to avoid:**

Heat.

**Hazardous decomposition products:**

Thermal decomposition giving toxic and corrosive products :  
Halogen acids (HCl and HF)  
Carbon monoxide  
Carbon dioxide (CO<sub>2</sub>)  
Carbonyl halides

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**11. TOXICOLOGICAL INFORMATION**

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**Data for FORANE ® 22****Acute toxicity****Inhalation:**

Practically nontoxic. (rat) 4 h LC50 approx. 780 mg/l (220000 ppm).

**Skin Irritation:**

Moderately irritating. (rabbit) (Rapid evaporation of the liquid may cause frostbite.)

**Eye Irritation:**

Slightly irritating. (rabbit) (30 s) (gas spray)

**Sensitization:**

Causes cardiac sensitization. (dog, rat, mouse, rabbit and monkey) signs: irregular heart beat, rapid heart beat, in some cases, sudden death

**Skin Sensitization:**

Repeated skin exposure. (guinea pig) No skin allergy was observed.

**Repeated dose toxicity**

Repeated inhalation administration to rat, rabbit, mouse / affected organ(s): liver, lung, central nervous system / (Repeated exposure at high concentrations)

Chronic oral administration to rat / No adverse effects reported.

**Carcinogenicity**

Chronic inhalation administration to mouse / No increase in tumor incidence was reported.

Chronic inhalation administration to female rat / No increase in tumor incidence was reported.

Chronic inhalation administration to male rat / affected organ(s): salivary gland / Increased incidence of tumors was reported. (The observed tumors do not appear to be relevant for men.)

**Genotoxicity****Assessment in Vitro:**

Genetic changes were observed in laboratory tests using: bacteria

No genetic changes were observed in laboratory tests using: animal cells, yeast

**Assessment in Vivo:**

No genetic changes were observed in laboratory tests using: animals, rodent

**Developmental toxicity**

Exposure during pregnancy. inhalation (rat) / Birth defects were observed. (eye)

Exposure during pregnancy. inhalation (rabbit) / No birth defects were observed.

**Reproductive effects**

Reproduction test. inhalation (rat and mouse) / No toxicity to reproduction / (males)

**Human experience****Inhalation:**

Lung: Asphyxia, suffocation.

Heart: Palpitation. (based on reports of occupational exposure to workers)

**Skin contact:**

Skin: irritation, redness, swelling. (repeated or prolonged exposure)

**12. ECOLOGICAL INFORMATION****Chemical Fate and Pathway****Data for FORANE ® 22****Biodegradation:**

Not readily biodegradable. (28 d) biodegradation 0 %

**Octanol Water Partition Coefficient:**

log Pow = 1.08 (Practically no potential to bioaccumulate.)

**Photodegradation:**

Half-life direct photolysis: = 8.4 y

**Mobility and Distribution in the Environment:**

Moderate adsorption / Log Koc = 1.8

**Global Warming Potential:**

GWP = 0.33 (Halocarbon global warming potential.)

**Ozone Depletion Potential:**

ODP = 0.055

**Ecotoxicology****Data for FORANE ® 22****Aquatic toxicity data:**

Practically nontoxic. Fish 24 h Toxicity threshold = 180 mg/l

**Microorganisms:**

Slightly toxic. under anaerobic conditions / Bacteria 24 h Toxicity threshold > 400 mg/l

**13. DISPOSAL CONSIDERATIONS****Waste disposal:**

Do not vent the container contents, or product residuals, to the atmosphere. Recover and reclaim unused contents or residuals as appropriate. Recovered/reclaimed product can be returned to an approved certified reclaimer or back to the seller depending on the material. Completely emptied disposable containers can be disposed of as recyclable steel. Returnable cylinders must be returned to seller. Dispose of in accordance with federal, state and local regulations. Consult a regulatory specialist to determine appropriate state or local reporting requirements, for assistance in waste characterization and/or hazardous waste disposal and other requirements listed in pertinent environmental permits. 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****US Department of Transportation (DOT)**

UN Number : 1018  
Proper shipping name : Chlorodifluoromethane (Refrigerant gas R 22)  
Class : 2.2  
Marine pollutant : no

**International Maritime Dangerous Goods Code (IMDG)**

UN Number : 1018  
Proper shipping name : CHLORODIFLUOROMETHANE (REFRIGERANT GAS R 22)  
Class : 2.2  
Marine pollutant : no

**15. REGULATORY INFORMATION****Chemical Inventory Status**

EU. EINECS	EINECS	Conforms to
US. Toxic Substances Control Act	TSCA	The components of this product are all on the TSCA Inventory.
Australia. Industrial Chemical (Notification and Assessment) Act	AICS	Conforms to
Canada. Canadian Environmental Protection Act (CEPA). Domestic Substances List (DSL). (Can. Gaz. Part II, Vol. 133)	DSL	All components of this product are on the Canadian DSL list.
Japan. Kashin-Hou Law List	ENCS (JP)	Does not conform
Korea. Toxic Chemical Control Law (TCCL) List	KECI (KR)	Conforms to
Philippines. The Toxic Substances and Hazardous and Nuclear Waste Control Act	PICCS (PH)	Conforms to

**FORANE ® 22**

China. Inventory of Existing Chemical Substances	IECSC (CN)	Conforms to
New Zealand. Inventory of Chemicals (NZIoC), as published by ERMA New Zealand	NZIOC	Does not conform

**United States – Federal Regulations****SARA Title III – Section 302 Extremely Hazardous Chemicals:**

The components in this product are either not SARA Section 302 regulated or regulated but present in negligible concentrations.

**SARA Title III - Section 311/312 Hazard Categories:**

Acute Health Hazard, Sudden Release of Pressure Hazard

**SARA Title III – Section 313 Toxic Chemicals:**

<u>Chemical Name</u>	<u>CAS-No.</u>	<u>De minimis concentration</u>	<u>Reportable threshold:</u>
Methane, chlorodifluoro-	75-45-6	1.0 %	10000 lbs (Otherwise used (non-manufacturing/processing)) 25000 lbs (Manufacturing and processing)

**Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) - Reportable Quantity (RQ):**

The components in this product are either not CERCLA regulated, regulated but present in negligible concentrations, or regulated with no assigned reportable quantity.

**OSHA Regulated Carcinogens (NTP, IARC, OSHA Listed):****NTP:**

No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

**IARC:**

No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

**OSHA:**

No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

**United States – State Regulations****Massachusetts Right to Know**

<u>Chemical Name</u>	<u>CAS-No.</u>
Methane, chlorodifluoro-	75-45-6

**FORANE ® 22****New Jersey Right to Know**

Chemical Name  
Methane, chlorodifluoro-

CAS-No.  
75-45-6

**Pennsylvania Right to Know**

Chemical Name  
Methane, chlorodifluoro-

CAS-No.  
75-45-6

**Pennsylvania Right to Know – Environmentally Hazardous Substance(s)**

Chemical Name  
Methane, chlorodifluoro-

CAS-No.  
75-45-6

**California Prop. 65**

This product does not contain any chemicals known to the State of California to cause cancer, birth defects, or any other reproductive defects.

**16. OTHER INFORMATION****Latest Revision(s):**

Revised Section(s):	Initial entry
Reference number:	000000033818
Date of Revision:	02/17/2009
Date Printed:	02/17/2009

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