

Product: FORANE® 22

Page: 1 / 7

SDS No.: 005920-001 (Version 1.3)

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SECTION 1: IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING

Substance name: FORANE® 22

Recommended use of the chemical and restrictions on use :

Use of the Substance/Mixture : Low temperature refrigerant, Air conditioning
Intermediate

Company/Undertaking Identification:

Supplier Arkema (Changshu) Fluorochemical Co., Ltd.
No.18 Haining Road, Advanced Materials Industrial Park
215522 Changshu, Jiangsu, China
Telephone: +86 512 5232 2688
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SECTION 2: HAZARDS IDENTIFICATION

2.1. Classification of the substance or mixture:

Gases under pressure, Liquefied gas, H280
Hazardous to the ozone layer, Category 1, H420

Additional information:

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2. Label elements:

GHS-Labeling

Hazardous components which must be listed on the label:

Chlorodifluoromethane

Hazard pictograms:



Signal word:

Warning

Hazard statements:

H280 : Contains gas under pressure; may explode if heated.
H420 : Harms public health and the environment by destroying ozone in the upper atmosphere.

Precautionary statements:

Prevention:
P273 : Avoid release to the environment.
Storage:
P410 + P403 : Protect from sunlight. Store in a well-ventilated place.
Disposal:
P502 : Refer to manufacturer/ supplier for information on recovery/ recycling.

Special labelling:

Contains fluorinated greenhouse gases covered by the Kyoto Protocol.

2.3. Other hazards:

Potential health effects:

Ejection of liquefied gas : frostbite possible

Environmental Effects:

Dangerous for the ozone layer. Not readily biodegradable. Practically not bioaccumulable

Physical and chemical hazards:

Thermal decomposition giving toxic and corrosive products.
Decomposition products: See chapter 10

SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

This product is a substance.

Hazardous components:

Chemical name ¹	EC-No.	CAS-No.	Concentration	Classification
Chlorodifluoromethane	200-871-9	75-45-6	>= 99,8 %	Press. Gas LG; H280 Ozone 1; H420

¹: See chapter 14 for Proper Shipping Name

SECTION 4: FIRST AID MEASURES

4.1. Description of necessary first-aid measures:

General advice:

No hazards which require special first aid measures.

Inhalation:

Move patient from contaminated area to fresh air. Oxygen or artificial respiration if needed. In case of persistent problems : Consult a physician.

Skin contact:

Wash off with plenty of water. Frostbite : treat as thermal burns.

Eye contact:

No hazards which require special first aid measures.

Ingestion:

No hazards which require special first aid measures.

Protection of first-aiders:

Confined space : risk of hypoxia. If entering a saturated atmosphere, wear a self contained breathing apparatus.

4.2. Most important symptoms/effects, acute and delayed: No data available.

4.3. Indication of any immediate medical attention and special treatment needed

Treatment: Do not administer catecholamines (because of the cardiac effect caused by the product).

SECTION 5: FIREFIGHTING MEASURES

5.1. Extinguishing media:

Suitable extinguishing media:

Use extinguishing measures to suit surroundings.

5.2. Specific hazards arising from the chemical:

The product is not flammable in air under ambient conditions of temperature and pressure. Certain mixtures of the product and air under pressure may be flammable
Thermal decomposition into chlorinated and fluorinated toxic and corrosive products: , Hydrogen chloride gas, Hydrogen fluoride, Phosgene, Carbon oxides

5.3. Advice for firefighters:

Specific methods:

Cool containers/tanks with water spray. Ensure a system for the rapid emptying of containers. In case of fire, remove exposed containers. Hazards of overpressurization in containers exposed to heat : explosion risk.

Special protective actions for fire-fighters:

Wear self-contained breathing apparatus and protective suit.

6. ACCIDENTAL RELEASE MEASURES

6.1. Personal precautions, protective equipment and emergency procedures:

Evacuate non-essential staff and those not equipped with individual protection apparatus. Ensure adequate ventilation. Avoid contact with the skin and the eyes. Avoid inhalation of vapours. In enclosed areas : ventilate or wear a self-contained breathing apparatus (risk of anoxia). Remove all sources of ignition. Do not smoke.

6.2. Environmental precautions:

Do not release into the environment.

6.3. Methods and materials for containment and cleaning up:

Neutralisation:

Stop leak if safe to do so.

Elimination: See chapter 13

6.4. Reference to other sections: None.

SECTION 7: HANDLING AND STORAGE

7.1. Precautions for safe handling:

Technical measures/Precautions:

Storage and handling precautions applicable to products: pressurised liquified gas Dangerous for the environment. Provide appropriate exhaust ventilation at machinery. Provide showers, eye-baths. Provide self-contained breathing apparatus nearby (for emergency intervention). Well ventilate empty vats and tanks before entering.

Safe handling advice:

Use product only in closed system. Prohibit ignition sources and contact with hot surfaces - DO NOT SMOKE.

Hygiene measures:

Avoid contact with skin and eyes and inhalation of vapours. When using do not eat, drink or smoke.
Wash hands after handling. Remove contaminated clothing and protective equipment before entering eating areas.

7.2. Conditions for safe storage, including any incompatibilities:

Store in waterproof containers. Keep away from open flames, hot surfaces and sources of ignition. Keep in a cool, well-ventilated place. Protect full containers from sources of heat to avoid overpressurization. Protect against light. Keep away from direct sunlight.

Incompatible products:

Alkali metals Alkaline earth metals Strong oxidizing agents Risk of violent reaction with : Chlorine (under certain conditions of temperature and pressure)

Packaging material:

Recommended: Ordinary steel

To be avoided: Alloys containing more than 2% of magnesium, Plastic materials

7.3. Specific end use(s): None.

SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1. Control parameters:

Exposure Limit Values Not relevant

8.2. Exposure controls:

General protective measures:

Ensure sufficient air exchange and/or exhaust in work areas
On each manufacture or use site, clearly-written substance-handling procedures should be available, kept up-to-date and their implementation controlled.
Use material of high integrity for loading and unloading.
Investigate engineering techniques to reduce exposures.
Routine monitoring and inspections for leaks to reduce fugitive emissions.
Frequently monitor and control the working atmosphere.

Personal protective equipment:

Respiratory protection:	In case of insufficient ventilation, wear suitable respiratory equipment.
Hand protection:	Leather gloves
Eye/face protection:	Safety glasses with side-shields
Skin and body protection:	Protective clothing (cotton)

Environmental exposure controls:

Do not release into the environment.
Use techniques to minimize emissions (incineration or any treatment to minimize level of release).

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

9.1. Information on basic physical and chemical properties

Appearance:

Physical state (20°C):	gaseous
Form:	compressed liquefied gas
Colour:	colourless
Odour:	No data available.
Olfactory threshold:	No data available.
pH:	Not applicable
Melting point/range :	-160 °C
Boiling point/boiling range :	-40,8 °C
Flash point:	Not applicable
Evaporation rate:	No data available.
Flammability (solid, gas):	
Flammability:	Non flammable product
Vapour pressure:	0,9135 MPa , at 20 °C 1,203 MPa , at 30 °C
Vapour density:	3,59 kg/m ³ , at 20 °C / 1.013 hPa (calculated)
Relative vapour density:	2,79 , at 20 °C Reference substance: Air=1 (Estimated.)
Density:	1.213 kg/m ³ , at 20 °C 1.085 kg/m ³ , at 50 °C
Water solubility:	3 g/l at 25 °C 1,5 g/l Solubility of water in the product at 30 °C
Partition coefficient: n-octanol/water:	log Kow : = 1,11 - 1,16 , at 20 °C, Slightly bioaccumulable. (OECD Test Guideline 107)
Auto-ignition temperature:	630 - 635 °C
Decomposition temperature:	480 °C
Viscosity, dynamic:	Not applicable
Explosive properties:	
Explosivity:	Not relevant (due to its chemical structure)
Oxidizing properties:	Not relevant (due to its chemical structure)

9.2. Other information:

Solubility in other solvents: Soluble in hydrocarbons and chlorinated solvents , Alcohols , Ketones , Esters

SECTION 10: STABILITY AND REACTIVITY

10.1. Reactivity: No data available.

10.2. Chemical stability:

The product is stable under normal handling and storage conditions.

10.3. Possibility of hazardous reactions:

- Reacts violently with : Chlorine Flammability risk.
(under certain conditions of temperature and pressure)

10.4. Conditions to avoid:

Keep away from heat and sources of ignition. Avoid contact with flames and red hot metallic surfaces Keep away from direct sunlight.

10.5. Incompatible materials to avoid:

Alkali metals, Alkaline earth metals, Strong oxidizing agents

10.6. Hazardous decomposition products:

Thermal decomposition:

Decomposition temperature: 480 °C

Thermal decomposition giving toxic and corrosive products :, Hydrogen fluoride, Hydrogen chloride gas, Phosgene, Carbon oxides

SECTION 11: TOXICOLOGICAL INFORMATION

All available and relevant data on this product and/or the components quoted in section 3 and/or the analogue substances/metabolites have been taken into account for the hazard assessment.

11.1. Information on toxicological effects:

Acute toxicity:

Inhalation: **Practically not harmful by inhalation**
Effects of breathing high concentrations of vapour may include: headache, Drowsiness, Dizziness
As with other volatile aliphatic halogenated compounds, through vapour accumulation and/or inhalation of large quantities, the product can cause: Loss of consciousness and cardiac disorders aggravated by stress and lack of oxygen, risk of mortality
• In animals : No mortality/4 h/Rat: 220000 ppm (Method: OECD Test Guideline 403)

Local effects (Corrosion / Irritation / Serious eye damage):

Skin contact: Ejection of liquefied gas : frostbite possible

Eye contact: Ejection of liquefied gas : frostbite possible

Respiratory or skin sensitisation:

Inhalation: No data available.

Skin contact: Not relevant (gas)

CMR effects :

Mutagenicity: **According to available experimental data: Overall not genotoxic**

In vitro
Ames test: Active
Chromosome aberration test in vitro: Inactive

In vivo
Micronucleus test in vivo rat: Inactive

Carcinogenicity: **Experimentation on animals has not shown clear evidence of carcinogenic effect**
• In animals : Carcinogenic effects not demonstrated in animals (Method: OECD Test Guideline 453, Mouse, lifetime, Inhalation) (180 mg/l)
Increase in tumor incidence was reported. (Method: OECD Test Guideline 453, Rat, lifetime, Inhalation) (180 mg/l)

Reproductive toxicity:

Fertility: **Based on the available data, the substance is not suspected of having reprotoxic potential.**
• In animals : Reproduction Test: Absence of toxic effects on fertility (Rat, Inhalation)

Specific target organ toxicity :

Single exposure :

Inhalation: **The substance or mixture is not classified as specific target organ toxicant, single exposure.**

Repeated exposure: **The substance or mixture is not classified as specific target organ toxicant, repeated exposure.**

Inhalation: No adverse systemic effects reported.
NOAEL= 10000ppm (rat, mouse, Chronic)

Aspiration hazard:

Not relevant

SECTION 12: ECOLOGICAL INFORMATION

Ecotoxicology Assessment: All available and relevant data on this product and/or the components quoted in section 3 and/or the analogue substances/metabolites have been taken into account for the hazard assessment.

12.1. Toxicity :

Aquatic invertebrates: **Slightly harmful to daphnia**
48 h (Daphnia magna (Water flea)) : = 433 mg/l (Method: OECD Test Guideline 202)

Aquatic plants: **Slightly harmful to algae**
EC50, 96 h (Algae) : = 250 mg/l (Method: calculated)

12.2. Persistence and degradability :

Biodegradation (In water): **Not readily biodegradable.**
Not readily biodegradable.: 0 % after 28 d (Method: OECD Test Guideline 301 D)

Photodegradation (In air):
Degradation by radicals OH: Direct photolysis (Half-life) : 2.463 d, Method: calculated

12.3. Bioaccumulative potential :

Bioaccumulation: **Not expected to bioaccumulate.**
Partition coefficient: n-octanol/water: log Kow : = 1,11 - 1,16 , at 20 °C, Slightly bioaccumulable.
(Method: OECD Test Guideline 107)

12.4. Mobility in soil - Distribution among environmental compartments:

Vapor pressure: 0,9135 MPa, 20 °C
1,203 MPa, 30 °C

12.5. Results of PBT and vPvB assessment :

According to REACH regulation, annex XIII, the substance does not meet PBT and vPvB criteria.

12.6. Other adverse effects:

Global warming potential: Global warming potential with respect to CO2 (time horizon 100 years) , Value: 1.700

Ozone depletion potential: Ozone depletion potential; ODP; (R-11 = 1) , Value: 0,055

SECTION 13: DISPOSAL CONSIDERATIONS

13.1. Waste treatment methods:

Disposal of product: Recycle or incinerate at an approved waste disposal site. In accordance with local and national regulations.
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.

Disposal of packaging: Purging of residual gases in empty packaging is obligatory before recovery.

SECTION 14: TRANSPORT INFORMATION

Regulation	14.1. UN number	14.2. UN proper shipping name	14.3. Class*	Label	14.4. PG*	14.5. Environmental hazards	14.6. Special precautions for user
IATA Cargo	1018	Chlorodifluoromethane	2.2	2.2		no	
IATA Passenger	1018	Chlorodifluoromethane	2.2	2.2		no	
IMDG	1018	CHLORODIFLUOROMETHANE	2.2	2.2		no	EmS Number: F-C, S-V

*Description: 14.3. Transport hazard class(es)
14.4. Packing group

14.7. Maritime transport in bulk according to IMO instruments: Not applicable

SECTION 15: REGULATORY INFORMATION

Not listed International Chemical Weapons Convention (CWC) Schedules of Toxic Chemicals and Precursors
Not listed Rotterdam Convention (Prior Informed Consent)
Not listed Stockholm Convention (Persistent Organic Pollutants)
This product contains one or more component(s) listed on: Montreal Protocol (Ozone Depleting Substances)
Not listed Kyoto Protocol to the United Nations Framework Convention on Climate Change, Annex A, Greenhouse Gases

INVENTORIES:

European union/EEA:	In the event of purchase from an Arkema legal entity based in the European Economic Area (EEA), it is established that this product complies with the registration provisions of REACH Regulation (EC) No. 1907/2006, given that all of its components are excluded, exempted and / or registered. If purchasing from a legal entity established outside the EEA, please contact your local representative for more information.
TSCA (USA) :	The components of this product are all on the TSCA Inventory
DSL/NDL (Canada) :	All components of this product are on the Canadian DSL
IECSC (CN):	All components of this product are listed or exempted
ENCS (JP):	All components of this product are listed or exempted
ISHL (JP):	All components of this product are listed or exempted
KECI (KR):	All components of this product are listed or exempted
PICCS (PH):	All components of this product are listed or exempted
NZIOC (NZ) :	All components of this product are listed or exempted
AIIC (AU) :	All components of this product are listed or exempted
TCSI (TW) :	All components of this product are listed or exempted

SECTION 16: OTHER INFORMATION

Full text of H, EUH-phrases referred to under sections 2 and 3

H280	Contains gas under pressure; may explode if heated.
H420	Harms public health and the environment by destroying ozone in the upper atmosphere.

Thesaurus:

NOAEL : No Observed Adverse Effect Level (NOAEL)
LOAEL : Lowest Observed Adverse Effect Level (LOAEL)
bw : Body weight
food : oral feed
dw : Dry weight

This information applies to the PRODUCT AS SUCH and conforming to specifications of ARKEMA. In case of formulations or mixtures, it is necessary to ascertain that a new danger will not appear. The information contained is based on our knowledge of the product, at the date of publishing and it is given quite sincerely. Users are advised of possible additional hazards when the product is used in applications for which it was not intended. This sheet shall only be used and reproduced for prevention and security purposes. The references to legislative, regulatory and codes of practice documents cannot be considered as exhaustive. It is the responsibility of the person receiving the product to refer to the totality of the official documents concerning the use, the possession and the handling of the product. It is also the responsibility of the handlers of the product to pass on to any subsequent persons who will come into contact with the product (usage, storage, cleaning of containers, other processes) the totality of the information contained within this safety data sheet and necessary for safety at work, the protection of health and the protection of environment.

NB: In this document the numerical separator of the thousands is the "." (point), the decimal separator is "," (comma).

