

FORANE® 427A

1. PRODUCT AND COMPANY IDENTIFICATION

Company

Arkema Canada Inc.
1100 Burloak Drive, Suite 107
Burlington, Ontario, L7L 6B2

Fluorochemicals

Customer Service Telephone Number: (800) 567-5726
(Monday through Friday, 8:30 AM to 4:30 PM EST)

Emergency Information

Transportation: CANUTEC: (613) 996-6666
(24 hrs., 7 days a week)

Medical: Rocky Mountain Poison Center: (866) 767-5089
(24 hrs., 7 days a week)

Product Information

Product name: FORANE® 427A
Synonyms: R427A
Molecular formula: Complex Mixture
Chemical family: Hydrofluorocarbon
Product use: Refrigerant

2. HAZARDS IDENTIFICATION

Emergency Overview

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 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. Vapor: Vapor is heavier than air and can cause suffocation by reducing oxygen available for breathing. May also cause: Central nervous system effects: headache, nausea, dizziness, drowsiness, loss of consciousness. Stress induced heart effects: irregular heart beat, rapid heart beat, (severity of effects depends on extent of exposure). (severity of effects depends on extent of exposure) .

Skin:

Slightly irritating. (based on components) Contact with liquid or refrigerated gas can cause cold burns and frostbite.

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Inhalation:

Practically nontoxic. (based on components)

Eyes:

Slightly irritating. (based on components) Contact with liquid or refrigerated gas can cause cold burns and frostbite.

Medical conditions aggravated by overexposure:

Heart disease or compromised heart function.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Chemical Name	CAS-No.	Wt/Wt	WHMIS Controlled
Ethane, 1,1,1,2-tetrafluoro-	811-97-2	>= 30 - < 60 %	Y
Ethane, pentafluoro-	354-33-6	>= 10 - < 30 %	Y
Methane, difluoro-	75-10-5	>= 10 - < 30 %	Y
Ethane, 1,1,1-trifluoro-	420-46-2	>= 5 - < 10 %	Y

The substance(s) marked with a "Y" in the above WHMIS Controlled column are those identified as hazardous chemicals under the Controlled Products 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. 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.

Ingestion:

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

Notes to physician:

Do not give drugs from adrenaline-ephedrine group.

5. FIREFIGHTING MEASURES

Flash point:	Not applicable
Auto-ignition temperature:	1,369 °F (743 °C)

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Lower flammable limit (LFL): None.

Upper flammable limit (UFL): None.

Extinguishing media (suitable):

Use extinguishing media appropriate to surrounding fire conditions.

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).

Further firefighting advice:

Fight fire with large amounts of water from a safe distance.

Stop the flow of gas if possible.

Water mist should be used to reduce vapor concentrations in air.

Cool closed containers exposed to fire with water spray.

Closed containers of this material may explode when subjected to heat from surrounding fire.

After a fire, wait until the material has cooled to room temperature before initiating clean-up activities.

Fire fighting equipment should be thoroughly decontaminated after use.

Hazardous combustion products:

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:

hydrofluoric acid

Carbon oxides

Carbonyl halides

Explosion Data:

Sensitivity to Mechanical Impact: No

Sensitivity to Static Discharge: No

6. ACCIDENTAL RELEASE MEASURES

In case of spill or leak:

Prevent further leakage or spillage if you can do so without risk. Evacuate area of all unnecessary personnel.

Eliminate all ignition sources. 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. Avoid breathing leaked material. Consult a regulatory specialist to determine appropriate provincial 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:

Product code: F0502

Version 1.1

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Avoid breathing gas.
 Avoid contact with skin, eyes and clothing.
 Keep away from heat, sparks and flames.
 Wear cold-insulating gloves/face shield/eye protection.
 Keep container closed.
 Use only with adequate ventilation.
 Use equipment rated for cylinder pressure.
 Use a backflow preventative device in piping.
 Wash thoroughly after handling.
 Close valve after each use and when empty.
 Do not enter confined spaces unless adequately ventilated.
 DO NOT CUT, DRILL, GRIND, OR WELD ON OR NEAR THIS CONTAINER.
 Emptied container retains vapor and product residue.
 Observe all labeled safeguards until container is cleaned, reconditioned or destroyed.

Storage

General information on storage conditions:

Keep away from direct sunlight. Keep cylinders restrained. Store in cool, dry, well ventilated area away from 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:

Store separate from:

Finely divided metals (aluminium, magnesium, zinc...)

Strong bases

Alkali metals

Alkaline earth metals

Strong oxidizing agents

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Airborne Exposure Guidelines:

Ethane, 1,1,1,2-tetrafluoro- (811-97-2)

US. OARS. WEELs Workplace Environmental Exposure Level Guide

time weighted average	1,000 ppm (4,240 mg/m3)
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Remarks:	Listed
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Ethane, pentafluoro- (354-33-6)

US. OARS. WEELs Workplace Environmental Exposure Level Guide

time weighted average	1,000 ppm (4,900 mg/m3)
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Remarks:	Listed
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Methane, difluoro- (75-10-5)

US. OARS. WEELs Workplace Environmental Exposure Level Guide

time weighted average 1,000 ppm (2,200 mg/m3)

Remarks: Listed

Ethane, 1,1,1-trifluoro- (420-46-2)

US. OARS. WEELs Workplace Environmental Exposure Level Guide

time weighted average 1,000 ppm (3,400 mg/m3)

Remarks: Listed

Engineering controls:

Investigate engineering techniques to reduce exposures below airborne exposure limits or to otherwise reduce exposures. Provide ventilation if necessary to minimize exposures or to control exposure levels to below airborne exposure limits (if applicable see above). If practical, use local mechanical exhaust ventilation at sources of air contamination such as open process equipment.

Monitor carbon monoxide and oxygen levels in tanks and enclosed spaces. Consult ACGIH ventilation manual, NFPA Standard 91 and NFPA Standard 654 for design of exhaust system and safe handling.

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.

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:

Use good industrial practice to avoid eye contact.

9. PHYSICAL AND CHEMICAL PROPERTIES

Color: Clear - colourless

Physical state: gaseous

Form: Liquefied gas

Odor: Ether-like (slightly)

Odour Threshold: Not determined

pH: Not applicable

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Density:	1.17 g/cm ³
Vapor pressure:	8,052 mmHg 68 °F (20 °C)
Vapor density:	not determined
Boiling point/boiling range:	-42.7 - -35.5 °C
Evaporation rate:	No data available
Solubility in water:	not determined
Oil/water partition coefficient:	Not applicable
Thermal decomposition	No data available
Flammability (solid, gas):	Not classified as a flammability hazard

10. STABILITY AND REACTIVITY

Stability:

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

Hazardous reactions:
Materials to avoid:

Alkaline earth metals
Strong oxidizing agents
Finely divided metals (aluminium, magnesium, zinc...)
Alkali metals
Strong bases

Conditions / hazards to avoid:

Heat.

Hazardous decomposition products:

Thermal decomposition giving toxic and corrosive products :
Hydrogen fluoride
Carbonyl halides
Carbon oxides

11. TOXICOLOGICAL INFORMATION

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

Data for Ethane, 1,1,1,2-tetrafluoro- (811-97-2)
Acute toxicity

Oral:

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LD50 - No data available.

Dermal:

LD50 - No data available.

Inhalation:

Practically nontoxic. (Rat) 4 h LC50 (approximately 567000 ppm) .

Signs/effects reported after acute exposure. (mouse, dog, cat, monkey) signs: anesthetic effects

Skin Irritation:

Practically non-irritating. (Rabbit) Irritation Index: < 1 / 8. (24 h) (occluded exposure)

Eye Irritation:

Practically non-irritating. (Rabbit) (vapor)

Sensitization:

Causes cardiac sensitization. inhalation. (Dog) Stress induced heart effects: irregular heart beat, rapid heart beat, in some cases, sudden death (Reaction may occur in response to stress (natural adrenaline release) or administration of epinephrine.)

Skin Sensitization:

Not a skin sensitizer. Guinea pig maximization test. No skin allergy was observed

Repeated dose toxicity

No data available.

Carcinogenicity

No data available.

Genotoxicity**Assessment in Vitro:**

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

Assessment in Vivo:

No genetic changes were observed in laboratory tests using: rats, mice

Developmental toxicity

Exposure during pregnancy. inhalation (Rat) / No birth defects were observed. (delays in development, at doses that produce effects in mothers)

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

Reproductive effects

Two-generation study. inhalation (Rat) / No toxicity to reproduction.

Data for Ethane, pentafluoro- (354-33-6)**Acute toxicity****Oral:**

LD50 - No data available.

Dermal:

LD50 - No data available.

Inhalation:

Practically nontoxic. (Rat) 4 h LC50 (> 800000 ppm) .(Gas)

Skin Irritation:

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No data available.

Eye Irritation:

No data available.

Sensitization:

Causes cardiac sensitization. inhalation. (Dog) Stress induced heart effects: irregular heart beat, rapid heart beat, in some cases, sudden death (Reaction may occur in response to stress (natural adrenaline release) or administration of epinephrine.)

Skin Sensitization:

No data available.

Repeated dose toxicity

No data available.

Carcinogenicity

No data available.

Genotoxicity**Assessment in Vitro:**

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

Assessment in Vivo:

No genetic changes were observed in laboratory tests using: mice

Developmental toxicity

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

Reproductive effects

No data available.

Data for Methane, difluoro- (75-10-5)**Acute toxicity****Oral:**

LD50 - No data available.

Dermal:

LD50 - No data available.

Inhalation:

Practically nontoxic. (Rat) 4 h LC50 (> 520000 ppm) .signs: anesthetic effects, central nervous system depression

Skin Irritation:

No data available.

Eye Irritation:

No data available.

Sensitization:

Cardiac sensitization not observed. Inhalation. (Dog) tremors

Skin Sensitization:

No data available.

FORANE® 427A**Repeated dose toxicity**

No data available.

Carcinogenicity

No data available.

Genotoxicity**Assessment in Vitro:**

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

Assessment in Vivo:

No genetic changes were observed in laboratory tests using: mice

Developmental toxicity

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

Reproductive effects

No data available.

Data for Ethane, 1,1,1-trifluoro- (420-46-2)**Acute toxicity****Oral:**

LD50 - No data available.

Dermal:

LD50 - No data available.

Inhalation:

No deaths occurred. (Rat) 4 h LC0 (> 591000 ppm) .

Skin Irritation:

No data available.

Eye Irritation:

No data available.

Sensitization:

Causes cardiac sensitization. Inhalation. (Dog) Stress induced heart effects: irregular heart beat, rapid heart beat, in some cases, sudden death (Reaction may occur in response to stress (natural adrenaline release) or administration of epinephrine.)

Skin Sensitization:

No data available.

Repeated dose toxicity

Repeated inhalation administration to rat and guinea pig / affected organ(s): lung / signs: irritation, bronchitis, pneumonia

Chronic oral administration to Rat / No adverse effects reported.

Carcinogenicity

No data available.

Genotoxicity**Assessment in Vitro:**

No genetic changes were observed in laboratory tests using: bacteria, human cells

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Assessment in Vivo:

No genetic changes were observed in laboratory tests using: mice

Developmental toxicity

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

Reproductive effects

No data available.

12. ECOLOGICAL INFORMATION

Chemical Fate and Pathway

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

Data for Ethane, 1,1,1,2-tetrafluoro- (811-97-2)
Biodegradation:

Not readily biodegradable. (28 d) biodegradation 3 %

Octanol Water Partition Coefficient:

log Pow = 1.06

Photodegradation:

Degradation in the atmosphere Half-life direct photolysis: 9.6 - 16.7 y

Data for Ethane, pentafluoro- (354-33-6)
Biodegradation:

Not readily biodegradable. (Closed Bottle test, 28 d) biodegradation 5 %

Octanol Water Partition Coefficient:

log Pow = 1.48

Global Warming Potential:

GWP 0.84 (Halocarbon global warming potential; HGWP; (R-11 = 1))

GWP 3,450 (Global warming potential with respect to CO₂ (time horizon 100 years))

Ozone Depletion Potential:

ODP 0.001 (Ozone depletion potential; ODP; (R-11 = 1))

Data for Methane, difluoro- (75-10-5)
Biodegradation:

Not readily biodegradable. (28 d) biodegradation 5 %

Octanol Water Partition Coefficient:

log Pow = 0.21

Global Warming Potential:

GWP 543 (Global warming potential with respect to CO₂ (time horizon 100 years))

Ozone Depletion Potential:

ODP 0 (Ozone depletion potential; ODP; (R-11 = 1))

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Data for Ethane, 1,1,1-trifluoro- (420-46-2)

Octanol Water Partition Coefficient:

log Pow = 1.73 (calculated)

Ecotoxicology

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

Data for Ethane, 1,1,1,2-tetrafluoro- (811-97-2)

Aquatic toxicity data:

Practically nontoxic. Oncorhynchus mykiss (rainbow trout) 96 h LC50 = 450 mg/l

Aquatic invertebrates:

Practically nontoxic. Daphnia magna (Water flea) 48 h EC50 = 930 mg/l

Microorganisms:

Practically nontoxic. Pseudomonas putida 16 h EC10 > 730 mg/l

Data for Ethane, 1,1,1-trifluoro- (420-46-2)

Aquatic toxicity data:

No more than slightly toxic. Oncorhynchus mykiss (rainbow trout) 96 h LC50 > 40 mg/l

Aquatic invertebrates:

Practically nontoxic. Daphnia magna (Water flea) 48 h EC50 = 300 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, provincial and local regulations.

Consult a regulatory specialist to determine appropriate provincial 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, provincial and local waste disposal requirements may be more restrictive or otherwise different from federal laws and regulations.

14. TRANSPORT INFORMATION

Canadian Transportation of Dangerous Good (TDG)

UN Number	:	3163
Proper shipping name	:	Liquefied gas, n.o.s.
Technical name	:	(1,1,1,2-Tetrafluoroethane, Pentafluoroethane)
Class	:	2.2
Marine pollutant	:	no

International Maritime Dangerous Goods Code (IMDG)

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UN Number : 3163
 Proper shipping name : LIQUEFIED GAS, N.O.S.
 Technical name : (1,1,1,2-TETRAFLUOROETHANE, PENTAFLUOROETANO)
 Class : 2.2
 Marine pollutant : no

15. REGULATORY INFORMATION

Chemical Inventory Status

EU. EINECS	EINECS	Conforms to
United States TSCA Inventory	TSCA	The components of this product are all on the TSCA Inventory.
Canadian Domestic Substances List (DSL)	DSL	All components of this product are on the Canadian DSL.
China. Inventory of Existing Chemical Substances in China (IECSC)	IECSC (CN)	Does not conform
Japan. ENCS - Existing and New Chemical Substances Inventory	ENCS (JP)	Conforms to
Japan. ISHL - Inventory of Chemical Substances	ISHL (JP)	Conforms to
Korea. Korean Existing Chemicals Inventory (KECI)	KECI (KR)	Conforms to
Philippines Inventory of Chemicals and Chemical Substances (PICCS)	PICCS (PH)	Conforms to
Australia Inventory of Chemical Substances (AICS)	AICS	Conforms to
New Zealand. Inventory of Chemical Substances	NZIOC	Conforms to

Canada - Federal Regulations

Workplace Hazardous Materials Information System (WHMIS)

A: Compressed gas
 D2B: Toxic material causing other toxic effects

Ingredient Disclosure List (IDL)

WHMIS Ingredient Disclosure List IDL: No component is listed on the WHMIS ingredients disclosure list.

WHMIS Regulated Carcinogens (IARC, ACGIH Listed):

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.

ACGIH:

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

FORANE® 427A**National Pollution Release Inventory (NPRI)**

Canadian National Pollutant Release Inventory (NPRI): No component is listed on the NPRI above the threshold.

16. OTHER INFORMATION**Miscellaneous:**

Other information:

A significant new activity notice (SNAC notice) has been issued for Difluoromethane (HFC-32) and Pentafluoroethane (HFC-125) and 1,1,1-Trifluoroethane (HFC-143A). It is the responsibility of the users of the substance to be aware of and comply with the SNAC notice and to submit a SNAC notification to Environment Canada prior to the commencement of a significant new activity associated with the substance.

Latest Revision(s):

Reference number: 000000058715

Date of Revision: 10/16/2014

Date Printed: 11/26/2014

PREPARED BY: TECHNICAL DEPARTMENT

PHONE NUMBER OF PREPARER: (800) 567-5726

PREPARATION DATE: 10/16/2014

FORANE® is a registered trademark of Arkema Inc.

THIS PRODUCT HAS BEEN CLASSIFIED IN ACCORDANCE WITH THE HAZARD CRITERIA OF THE CPR AND THE MSDS CONTAINS ALL THE INFORMATION REQUIRED BY THE CPR.

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