1. PRODUCT AND COMPANY IDENTIFICATION

Company

Arkema Inc.
900 First Avenue
King of Prussia, Pennsylvania 19406

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: (866) 767-5089
(24 hrs., 7 days a week)

Product Information

Product name:	FORANE® 134a
Synonyms:	HFC 134a, R 134a
Molecular formula:	CH2FCF3
Chemical family:	Hydrofluorocarbon
Molecular weight:	102.03 g/mol
Product use:	Refrigerant, Foam blowing agent, Aerosol propellants

2. HAZARDS IDENTIFICATION

Emergency Overview

Color:	transparent
Physical state:	gas
Form:	Liquefied gas
Odor:	ether-like

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. Central nervous system effects: headache, nausea, dizziness, drowsiness, loss of consciousness. Stress induced heart effects: irregular heart beat, rapid heart beat, (extent of injury depends on severity of exposure).

Skin:
Slightly irritating. (based on animal studies) Contact with liquid or refrigerated gas can cause cold burns and frostbite.

Inhalation:
Practically nontoxic. (based on animal studies)

Eyes:
Slightly irritating. (based on animal studies) 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	OSHA Hazardous
Ethane, 1,1,1,2-tetrafluoro-	811-97-2	> 99 %	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. 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)

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:
Stop the flow of gas if possible.
Fire fighting equipment should be thoroughly decontaminated after use.
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:

hydrofluoric acid
Carbon oxides
Carbonyl halides

6. ACCIDENTAL RELEASE MEASURES

In case of spill or leak:
Eliminate all ignition sources. Evacuate area of all unnecessary personnel. Use Halogen leak detector or other suitable means to locate leaks or check atmosphere. Prevent further leakage or spillage if you can do so without risk. 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 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 breathing gas.
Keep container closed.
Avoid contact with the skin, eyes and clothing.
Use only with adequate ventilation.
Do not enter confined spaces unless adequately ventilated.
Use equipment rated for cylinder pressure.
Close valve after each use and when empty.
Use a backflow preventative device in piping.
Wash thoroughly after handling.
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:
Store separate from: Alkaline earth metals

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

Strong oxidizing agents

Alkali metals

Strong bases

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Airborne Exposure Guidelines:

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

US. Workplace Environmental Exposure Level (WEEL) Guides

Time Weighted Average (TWA):	1,000 ppm (4,240 mg/m3)
Remarks:	Listed

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 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.

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:
Use good industrial practice to avoid eye contact.

9. PHYSICAL AND CHEMICAL PROPERTIES

Color:	transparent
Physical state:	gas
Form:	Liquefied gas
Odor:	ether-like
pH:	not applicable
Density:	not determined
Specific Gravity (Relative density):	1.21 (77 °F(25 °C))
Vapor pressure:	4,432.000 mmHg (70.0 °F (21.1 °C))
Relative vapor density:	3.54
Vapor density:	not determined
Boiling point/boiling range:	-15.5 °F (-26.4 °C)
Freezing point:	-150 °F (-101 °C)

Melting point/range:	no data available
Solubility in water:	0.9 g/l 77 °F (25 °C)
Molecular weight:	102.03 g/mol
Thermal decomposition	> 698 °F (> 370 °C)
Critical point:	Critical pressure: 30,528 mmHg Critical temperature: 214 °F (101 °C)
Henry's constant:	10.2E+03 $Pa.m^3/mol$ 77 °F (25 °C) (Method: calculated)

10. STABILITY AND REACTIVITY

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

Materials to avoid:
Alkaline earth metals
Finely divided metals (aluminium, magnesium, zinc...)
Strong oxidizing agents
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 FORANE® 134a

Acute toxicity

Inhalation:
Practically nontoxic. (rat) 4 h LC50 approximately 2,360 mg/l (~ 567000 ppm).

Practically nontoxic. (rat) 0.5 h LC50 approximately 3,122 mg/l (~ 750000 ppm).

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

Skin Irritation:

Slightly irritating. (rabbit) (24 h)

Eye Irritation:
Slightly irritating. (rabbit)

Sensitization:
Causes cardiac sensitization. inhalation. (dog) Stress induced heart effects: signs: 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:
Repeated skin exposure. (guinea pig) No skin allergy was observed

Repeated dose toxicity
Repeated inhalation administration to rat / No adverse systemic effects reported.

Carcinogenicity
Chronic inhalation administration to male rat / affected organ(s): testes / signs: tumors were benign. / Increase in tumor incidence was reported.

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

1 year oral gavage administration to rat / No increase in tumor incidence was reported.

Genotoxicity

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

Assessment in Vivo:
No genetic changes were observed in laboratory tests using: animals

Developmental toxicity
Exposure during pregnancy. inhalation (rat and rabbit) / No birth defects were observed. (delays in development, at doses that produce effects in mothers)

Reproductive effects

Reproduction Test. inhalation (rat) / No toxicity to reproduction.

12. ECOLOGICAL INFORMATION

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

Data for FORANE® 134a

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
(in atmosphere)

Global Warming Potential:
GWP = 0.3 (Halocarbon global warming potential.)

Ozone Depletion Potential:
ODP = 0

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

Data for FORANE® 134a

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. Bacteria 16 h EC10 > 730 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	:	3159
Proper shipping name	:	1,1,1,2-Tetrafluoroethane(REFRIGERANT GAS R 134a)
Class	:	2.2
Marine pollutant	:	no

International Maritime Dangerous Goods Code (IMDG)

UN Number	:	3159
Proper shipping name	:	1,1,1,2-TETRAFLUOROETHANE (REFRIGERANT GAS R 134a)
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	Does not conform
Canada. Canadian Environmental Protection Act (CEPA). Domestic Substances List (DSL)	DSL	This product contains one or several components listed in the Canadian NDSL list. All other components are on the DSL list.
Japan. Kashin-Hou Law List	ENCS (JP)	Does not conform
Korea. Existing Chemicals Inventory (KECI)	KECI (KR)	Does not conform
Philippines. The Toxic Substances and Hazardous and Nuclear Waste Control Act	PICCS (PH)	Does not conform
China. Inventory of Existing Chemical Substances	IECSC (CN)	Does not conform
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:
SARA 313: This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

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

New Jersey Right to Know

No components are subject to the New Jersey Right to Know Act.

Pennsylvania Right to Know

Chemical Name	CAS-No.
Ethane, 1,1,1,2-tetrafluoro-	811-97-2

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

Miscellaneous:

Other information:	This MSDS covers the following grades: High Purity.

Latest Revision(s):

Revised Section(s):	Revised section 15.
Reference number:	000000033838
Date of Revision:	10/09/2012
Date Printed:	12/27/2012

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