

## Safety Data Sheet

**Product:** FORANE® 407F

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SDS No.: 005853-001 (Version 1.0)

Date 17.09.2015

### 1. IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING

Identification of the mixture : FORANE® 407F

Recommended use : Refrigerant

Supplier : Arkema Pty Ltd

Address : 313 Canterbury Road  
Canterbury, VIC 3126  
Australia  
Tel: +61 3 9211 5000  
Fax: +61 3 9211 5001

NZ Supplier:  
Chemiplas NZ Ltd  
137 Great North Road  
Grey Lynn, Auckland  
New Zealand  
Ph + 64 9 361 4060  
24 Hour Emergency Ph + 64 9 361 4061

Emergency telephone number : AUSTRALIA (toll free): 1800 033 111  
International: + 61 3 9663 2130

### 2. HAZARDS IDENTIFICATION

DANGEROUS GOODS. NON-HAZARDOUS SUBSTANCE..

Hazard classification according to the criteria of the Australian NOHSC  
Dangerous goods classification according to the Australian Dangerous Goods Code.

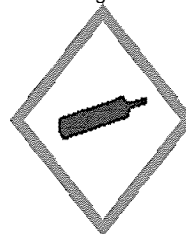
SUSDP : Not scheduled

Read Label before use  
Protect from sunlight. Store in a well-ventilated place

NZ HSNO Classifications:

Compressed gases

Contains gas under pressure, may explode if heated



Warning

### 3. COMPOSITION/INFORMATION ON INGREDIENTS

**Hazardous components :**

Chemical Name *)	CAS-No.	Concentration
1,1,1,2-Tetrafluoroethane	811-97-2	30 - 50 %
Difluoromethane	75-10-5	20 - 30 %
Pentafluoroethane	354-33-6	20 - 30 %

\*) See chapter 14 for Proper Shipping Name

### 4. 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 : Wash immediately, abundantly and thoroughly with water.  
If irritation persists, consult an ophthalmologist.

Ingestion : No hazards which require special first aid measures.

Protection of first-aiders : If entering a saturated atmosphere, wear a self contained breathing apparatus.

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

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### 5. FIREFIGHTING MEASURES

Suitable extinguishing media : This material is not flammable.  
 In case of fire, use water/water spray/water jet/carbon dioxide/sand/foam/alcohol resistant foam/chemical powder for extinction.

Specific hazards : Thermal decomposition giving toxic and corrosive products :  
 Hydrogen fluoride  
 Carbon oxides  
 halogenated compounds  
 One of the components of this preparation gives flammable mixtures with air

Specific methods : Prohibit all sources of sparks and ignition - Do not smoke.  
 Ensure a system for the rapid emptying of containers.  
 In case of fire, remove exposed containers.  
 Cool containers/tanks with water spray.

Special protective equipment for firefighters : Wear self-contained breathing apparatus and protective suit.

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### 6. ACCIDENTAL RELEASE MEASURES

Personal precautions : 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.  
 Evacuate non-essential staff and those not equipped with individual protection apparatus.

Environmental precautions : Do not release into the environment.

Recovery : Allow to evaporate.

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**7. HANDLING AND STORAGE**

## Handling

Technical measures/Precautions : Storage and handling precautions applicable to products:  
pressurised liquified gas  
Provide appropriate exhaust ventilation at machinery.  
Provide self-contained breathing apparatus nearby.  
Provide showers, eye-baths.  
Well ventilate empty vats and tanks before entering.

Safe handling advice : Prohibit ignition sources and contact with hot surfaces - DO NOT SMOKE.  
Open drum carefully as content may be under pressure.

## Storage

Technical measures/Storage conditions : Store at room temperature in the original container.  
Keep away from open flames, hot surfaces and sources of ignition.  
Keep away from heat and sources of ignition. Do not smoke.  
Keep in a cool, well-ventilated place.  
Protect full containers from sources of heat to avoid overpressurization.  
Do not store above: 50 °C

Incompatible products : Oxidizing agents  
Alkaline materials

## Packaging material

Recommended : Steel (Pressure resistant material)

Materials to avoid : Strong oxidizing agents

Store at room temperature in the original container.  
Keep away from open flames, hot surfaces and sources of ignition.  
Keep away from heat and sources of ignition. Do not smoke.  
Keep in a cool, well-ventilated place.  
Protect full containers from sources of heat to avoid overpressurization.

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**8. EXPOSURE CONTROLS/PERSONAL PROTECTION**

General protective measures : Provide sufficient air exchange and/or exhaust in work rooms.

## Control parameters

no exposure standard allocated

Personal protective equipment

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Respiratory protection	:	In case of insufficient ventilation, wear suitable respiratory equipment.
Hand protection	:	Leather gloves
Eye protection	:	Safety glasses with side-shields conforming to EN166
Skin and body protection	:	Protective clothing (cotton) Boots
Hygiene measures	:	Avoid contact with the skin and the eyes. Avoid exposure to vapour. When using do not eat, drink or smoke.

Select and use respirators in accordance with AS/NZS 1715/1716. Self-Contained Breathing Apparatus (SCBA) with positive pressure air supply to comply with AS/NZS 1715 / 1716, or any other acceptable International Standard, where applicable.

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### 9. PHYSICAL AND CHEMICAL PROPERTIES

Physical state (20°C)	:	gas
Form	:	Liquefied gas
Colour	:	Clear - colourless
Odour	:	ether-like
pH	:	neutral
Boiling point/boiling range	:	-45.5 °C (1,013 hPa)
Melting point/range	:	
Flash point	:	Not applicable
Flammability (solid, gas)	:	Non flammable product
Auto-ignition temperature	:	Not applicable
Explosive properties		
Explosion limits	:	No data available
	:	
Vapour pressure	:	10.212 hPa (21.1 °C)
Viscosity, dynamic	:	Not applicable
Partition coefficient: n-octanol/water	:	1,1,1,2-TETRAFLUOROETHANE : log Kow : 1.06 (OECD Test Guideline 107)
		DIFLUOROMETHANE : log Kow : 0.21 (OECD Test Guideline 107)

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PENTAFLUOROETHANE :  
 log Kow : 1.48 (OECD Test Guideline 107)

Critical point : Critical pressure: 46.6 bar  
 Critical temperature: 83 °C

### 10. STABILITY AND REACTIVITY

- Stability : The product is stable under normal handling and storage conditions.
- Conditions to avoid : Keep away from heat and sources of ignition.  
 Protect from light.  
 Avoid contact with flames and red hot metallic surfaces
- Materials to avoid : Alkaline hydroxides  
 Alkaline earth metals  
 Strong oxidizing agents  
 Finely divided metals
- Hazardous decomposition products : Thermal decomposition giving very toxic and corrosive products  
 Hydrogen fluoride  
 Carbon oxides  
 halogenated compounds

### 11. TOXICOLOGICAL INFORMATION

Acute toxicity

- Inhalation : According to its composition, can be considered as :  
 Slightly or not harmful by inhalation  
**1,1,1,2-TETRAFLUOROETHANE :**  
 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: 567000 ppm  
 (OECD Test Guideline 403)  
 Central nervous system depression  
 narcosis
- DIFLUOROMETHANE :**  
 At high vapour/fog concentrations :  
 headache  
 Dizziness  
 Drowsiness  
 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 :

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No mortality/4 h/Rat: 520000 ppm  
(OECD Test Guideline 403)

**PENTAFLUOROETHANE :**

Effects of breathing high concentrations of vapour may include:

headache

Dizziness

Drowsiness

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: 800000 ppm

(OECD Test Guideline 403)

**Local effects**

Skin contact : Ejection of liquefied gas : frostbite possible

Eye contact : Ejection of liquefied gas : frostbite possible

**Sensitisation**

Not relevant  
(gas)

Repeated dose toxicity : 1,1,1,2-TETRAFLUOROETHANE :  
• In animals :

Inhalation: Several yearsRat

No adverse effects reported.

NOAEL: 50000ppm

**DIFLUOROMETHANE :**

• In animals :

Inhalation: 3 Months / Rat

No specific toxic effects

NOAEL: 50000ppm

(OECD Test Guideline 413)

**PENTAFLUOROETHANE :**

• In animals :

Studies of prolonged inhalation in animals have not shown sub-chronic toxic effects

Inhalation: 3 Months / Rat

NOAEL: 50000ppm

(OECD Test Guideline 413)

**Specific effects**

Genotoxicity : According to its composition, can be considered as :  
Not genotoxic

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- In vitro** :
- 1,1,1,2-TETRAFLUOROETHANE :**
    - Ames test in vitro: Inactive (OECD Test Guideline 471)
    - In vitro chromosomal abnormality test on human lymphocytes: Inactive (OECD Test Guideline 473)
    - In vitro gene mutations test on mammalian cells: Inactive
  - DIFLUOROMETHANE :**
    - Ames test in vitro: Inactive (OECD Test Guideline 471)
    - In vitro chromosomal abnormality test on human lymphocytes: Inactive (OECD Test Guideline 473)
    - In vitro gene mutations test on mammalian cells: Inactive (OECD Test Guideline 476)
  - PENTAFLUOROETHANE :**
    - Ames test: negative (OECD Test Guideline 471)
    - In vitro test for chromosomal abnormalities on CHO cells: negative (OECD Test Guideline 473)
    - In vitro chromosomal abnormality test on human lymphocytes: negative (OECD Test Guideline 476)
- In vivo** :
- 1,1,1,2-TETRAFLUOROETHANE :**
    - Micronucleus test in vivo mouse: Inactive (OECD Test Guideline 474)
    - DNA repair test on rats hepatocytes: Inactive
  - DIFLUOROMETHANE :**
    - Micronucleus test in vivo mouse: Inactive (OECD Test Guideline 474)
  - PENTAFLUOROETHANE :**
    - Micronucleus test in vivo mouse: negative (OECD Test Guideline 474)
- Carcinogenicity** :
- Based on the available information, it is not possible to conclude on the hazard potential of this mixture.
  - 1,1,1,2-TETRAFLUOROETHANE :**
    - In animals :
    - By inhalation
    - 2 years/Rat
    - Absence of carcinogenic effects
  - No Observed Adverse Effect Level (NOAEL): 10,000 ppm
  - By oral route
  - 1 year/Rat
  - Absence of carcinogenic effects
  - No Observed Adverse Effect Level (NOAEL): 300 mg/kg bw/day
- Reproductive toxicity**
- Fertility** :
- Based on the available data, the substance is not suspected of having reprotoxic potential.

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**1,1,1,2-TETRAFLUOROETHANE :**

## • In animals :

NOAEL ( Parental toxicity ) : 50,000 ppm

NOAEL ( Fertility ) : 50,000 ppm

NOAEL ( Developmental Toxicity ) : 50000 ppm

(Mouse, By inhalation)

**DIFLUOROMETHANE :**

## • In animals :

NOAEL ( Parental toxicity ) : &gt; 50,000 ppm

NOAEL ( Fertility ) : &gt; 50,000 ppm

NOAEL ( Developmental Toxicity ) : &gt; 50000 ppm

(rat, mouse, Inhalation)

Foetal development : Based on the available data, the substance is not suspected of having developmental toxicity potential.

**1,1,1,2-TETRAFLUOROETHANE :**

## • In animals :

Absence of toxic effects for foetal development.

NOAEL ( Developmental Toxicity ) : 40,000 ppm

NOAEL ( Maternal Toxicity ) : 2,500 ppm

(Method: OECD Test Guideline 414, Rabbit, By inhalation) Absence of toxic effects for foetal development.

NOAEL ( Developmental Toxicity ) : 50,000 ppm

NOAEL ( Maternal Toxicity ) : 50,000 ppm

(Method: OECD Test Guideline 414, Rat, By inhalation)

**DIFLUOROMETHANE :**

## • In animals :

Absence of toxic effects for foetal development.

NOAEL ( Developmental Toxicity ) : 50,000 ppm

NOAEL ( Maternal Toxicity ) : 50,000 ppm

(Method: OECD Test Guideline 414, rat, rabbit, By inhalation)

**PENTAFLUOROETHANE :**

## • In animals :

Absence of toxic effects for foetal development.

NOAEL ( Developmental Toxicity ) : 245 mg/l

NOAEL ( Maternal Toxicity ) : 245 mg/l

(Method: OECD Test Guideline 414, rat, rabbit, By inhalation)

**12. ECOLOGICAL 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.

Mobility : 1,1,1,2-TETRAFLUOROETHANE :  
(calculated)

**DIFLUOROMETHANE :**

(calculated)

**PENTAFLUOROETHANE :**

(calculated)



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Persistence and degradability  
In water

1,1,1,2-  
TETRAFLUOROETHANE :  
Not readily biodegradable.:  
3 % after 28 d  
(OECD Test Guideline 301 D)

DIFLUOROMETHANE :  
Not readily biodegradable.:  
5 % after 28 d  
(OECD Test Guideline 301 D)

PENTAFLUOROETHANE :  
Not readily biodegradable.:  
5 % after 28 d  
(OECD Test Guideline 301 D)

Bioaccumulation : None of the product and /or component quoted in section 3 and/or analogue substance/metabolite is expected to bioaccumulate.

1,1,1,2-TETRAFLUOROETHANE :  
log Kow : 1.06 (OECD Test Guideline 107)

DIFLUOROMETHANE :  
log Kow : 0.21 (OECD Test Guideline 107)

PENTAFLUOROETHANE :  
log Kow : 1.48 (OECD Test Guideline 107)

## Aquatic toxicity

Acute toxicity  
Fish

: According to its composition, can be considered as :  
Slightly harmful to fish  
1,1,1,2-TETRAFLUOROETHANE :  
LC50, 96 h (Salmo gairdneri) : 450 mg/l  
(Directive 67/548/EEC, Annex V, C.1.)

DIFLUOROMETHANE :  
LC50, 96 h (Freshwater fish) : 1.507 mg/l  
(calculated)

PENTAFLUOROETHANE :  
(Results obtained on a similar product).  
LC50, 96 h (Oncorhynchus mykiss) : > 100 mg/l  
(OECD Test Guideline 203)

Aquatic invertebrates : According to its composition, can be considered as :  
Slightly harmful to daphnia  
1,1,1,2-TETRAFLUOROETHANE :

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EC50, 48 h (Daphnia magna (Water flea)) : 980 mg/l  
(Directive 67/548/EEC, Annex V, C.2.)

**DIFLUOROMETHANE :**

EC50, 48 h (Daphnia (water flea)) : 652 mg/l  
(calculated)

**PENTAFLUOROETHANE :**

(Results obtained on a similar product).

LC50, 48 h (Daphnia magna (Water flea)) : > 100 mg/l  
(OECD Test Guideline 202)

Aquatic plants

: According to its composition, can be considered as :

Slightly harmful to algae

**1,1,1,2-TETRAFLUOROETHANE :**

(Results obtained on a similar product).

Growth inhibition: EC50, 72 h (Pseudokirchneriella subcapitata (green algae)) : > 114 mg/l  
(OECD Test Guideline 201)

**DIFLUOROMETHANE :**

Growth inhibition: EC50, 96 h (Algae) : 142 mg/l  
(calculated)

**PENTAFLUOROETHANE :**

(Results obtained on a similar product).

Growth inhibition: EC50, 72 h (Pseudokirchneriella subcapitata) : > 114 mg/l  
(OECD Test Guideline 201)

Microorganisms

: **1,1,1,2-TETRAFLUOROETHANE :**

EC10, 6 h (Pseudomonas putida) : > 730 mg/l  
(No data available)

**13. DISPOSAL CONSIDERATIONS**

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

Dispose of container and unused contents in accordance with Federal, State and Local waste regulations.

**14. TRANSPORT INFORMATION****ADG**

UN Number : 1078  
Proper shipping name : frigorifique gas,n.s.a. (Refrigerant gas, n.o.s.)  
(Pentafluoroethane, 1,1,1,2-Tetrafluoroethane, Difluoromethane)  
Class : 2.2  
Label : 2.2  
Hazchem Code : 2TE

**IATA Cargo**

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UN Number : 1078  
 Proper shipping name : frigorigifque gas,n.s.a. (Refrigerant gas, n.o.s.)  
 (Pentafluoroethane, 1,1,1,2-Tetrafluoroethane, Difluoromethane)  
 Class : 2.2  
 Label : 2.2

**IATA Passenger**

UN Number : 1078  
 Proper shipping name : frigorigifque gas,n.s.a. (Refrigerant gas, n.o.s.)  
 (Pentafluoroethane, 1,1,1,2-Tetrafluoroethane, Difluoromethane)  
 Class : 2.2  
 Label : 2.2

**IMDG**

UN Number : 1078  
 Proper shipping name : FRIGORIFIQUE GAS,N.S.A.(REFRIGERANT GAS,N.O.S.)  
 (PENTAFLUOROETHANE, 1,1,1,2-TETRAFLUROETHANE,  
 DIFLUOROMETHANE)  
 Class : 2.2  
 Label : 2.2  
 EmS Number : F-C, S-V  
 Marine pollutant : no

**15. REGULATORY INFORMATION**

EEC DIRECTIVE

Safety data sheets : according to Regulation (EC) No. 1907/2006  
 EC classification / labelling  
 Dangerous Preparations : D. 1999/45/EC amended by D. 2006/8/CE

National regulatory information

SUSDP : Not scheduled

This product contains one or more component(s) listed on:  
 Inventories : Kyoto Protocol to the United Nations Framework Convention on  
 Climate Change, Annex A, Greenhouse Gases  
 EINECS: Conforms to  
 TSCA: Conforms to  
 DSL: All components of this product are on  
 the Canadian DSL  
 IECSC (CN): Conforms to  
 ENCS (JP): Conforms to  
 ISHL (JP): Conforms to  
 KECI (KR): Conforms to  
 PICCS (PH): Conforms to  
 AICS: Conforms to  
 NZIOC: Conforms to  
 TSCA 12B:

**NZ HSNO Approval no HSR002533  
 Compressed Gases (non-hazardous) Group  
 Standard 2006  
 Classifications: Compressed Gas - contains  
 gas under pressure, may explode if heated  
 For further information contact the NZ  
 supplier or go to [www.epa.govt.nz](http://www.epa.govt.nz)**

**16. OTHER INFORMATION**

This SDS has been prepared according to the National Code of Practice for the Preparation of Safety Data Sheets  
 [NOHSC:2011(2003)].

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

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End of Safety Data Sheet