

**MATERIAL SAFETY DATA SHEET (MSDS)
FORANE 427A**

(Please ensure that this MSDS is received by an appropriate person)

Date: October 2014

Version 1

Ref. no.: MS054

1. IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND OF THE COMPANY/UNDERTAKING

Product Name R427A
Chemical Name See Composition

Company Identification African Oxygen Limited
23 Webber Street
Johannesburg,
2001
Tel. No: (011) 490-0400
Fax No: (011) 490-0506

**Emergency Phone Number 0860 111185 or (011 873 4382)
(24 hours)**

2. HAZARDS IDENTIFICATION

Most important hazards:

Environmental Effects :

Physical and chemical hazards :

Additional information :

Not readily biodegradable

Thermal decomposition giving toxic and corrosive products

Decomposition products: See chapter 10

This preparation is not classified as dangerous according to

3. COMPOSITION/INFORMATION ON INGREDIENTS

Chemical nature of the preparation : Preparation based on :

Hazardous components :

Chemical Name *)	EC-No.	CAS-No.	Concentration	Classification
1,1,1,2-Tetrafluoroethane	212-377-0	811-97-2	50 %	-
Pentafluoroethane	206-557-8	354-33-6	25 %	-
Difluoromethane	200-839-4	75-10-5	15 %	F+; R12
1,1,1-Trifluoroethane	206-996-5	420-46-2	10 %	F+; R12

*) See chapter 14 for Proper Shipping Name

For the full text of the R phrases mentioned in this Section, see Section 16.

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 :

Frostbite : treat as thermal burns

Eye contact :

Wash immediately, abundantly and thoroughly with water

Ingestion :

If irritation persists, consult an ophthalmologist

Hospitalise

Protection of first-aiders :
equipment.

In case of insufficient ventilation, wear suitable respiratory

Notes to physician :

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

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5. FIRE-FIGHTING MEASURES

Specific hazards :

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

Specific methods :

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

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

6. ACCIDENTAL RELEASE MEASURES

Personal precautions :

Avoid contact with skin and eyes and inhalation of vapours ventilate or wear a self-contained breathing apparatus (risk of anoxia) Remove all sources of ignition.
Do not smoke.

In enclosed areas :

Environmental precautions :
instructions/ Safety data sheets.

Avoid release to the environment. Refer to special

7. HANDLING AND STORAGE

Handling

Technical measures/Precautions :

Storage and handling precautions applicable to products:
Gases under pressure
Provide appropriate exhaust ventilation at machinery.
Prohibit ignition sources and contact with hot surfaces - DO NOT SMOKE

Safe handling advice :

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 in a cool, well-ventilated place.
Protect full containers from sources of heat to avoid overpressurization

Packaging material

Recommended :

Materials to avoid :

Ordinary steel
Alloys containing more than 2% of magnesium
Plastic materials

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

General protective measures :
rooms.

Provide sufficient air exchange and/or exhaust in work

Control parameters

Exposure Limit Values

1,1,1,2-Tetrafluoroethane

Source	Date	Value Type	Value (ppm)	Value (ppm)	Remarks
Arkema		TWA	1.000	4.240	Value recommended by the "Exposure Limit Value Committee" of Arkema
WEEL	2007	TWA	1.000	4.240	-
WEEL	2007		-	-	Listed

Pentafluoroethane

Source	Date	Value Type	Value (ppm)	Value (ppm)	Remarks
Arkema		STEL	1.000	4.900	Value recommended by the "Exposure Limit Value Committee" of Arkema
WEEL	2006	TWA	1.000	4.900	-
WEEL	2006		-	-	Listed

Difloromethane

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Source	Date	Value Type	Value (ppm)	Value (ppm)	Remarks
Arkema		TWA	1.000	2.130	Value recommended by the "Exposure Limit Value Committee" of Arkema
WEEL	2006	TWA	1.000	2.200	-
WEEL	2006		-	-	Listed

1,1,1-Trifluoromethane

Source	Date	Value Type	Value (ppm)	Value (ppm)	Remarks
Arkema		STEL	1.000	3.400	Value recommended by the "Exposure Limit Value Committee" of Arkema
WEEL	2006	TWA	1.000	3.400	-
WEEL	2006		-	-	Listed

Personal protective equipment

Respiratory protection :	In case of insufficient ventilation, wear suitable respiratory equipment.
Hand protection :	Gloves
Eye protection :	Safety glasses with side-shields
Skin and body protection :	Protective clothing (cotton)
Hygiene measures :	Do not smoke. Avoid contact with the skin and the eyes. Avoid inhalation of vapours

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical state (20°C) :	gaseous
Form :	compressed liquefied gas
Colour :	colourless
Odour :	slightly ether-like
pH :	not applicable
Boiling point/boiling range :	-42,7 - -35,5 °C
Flash point :	Not applicable
Flammability (solid, gas) :	Non flammable product
Method: Standard :	ASTM E 681-85
Vapour pressure :	0,97 MPa (20 °C) 2,08 MPa (50 °C) 0,97 hPa (20 °C) Density : 1.172 kg/m3 (20 °C) Solubility:
- Water solubility :	Does not dissociate in water
Partition coefficient: n-octanol/water:	DIFLUOROMETHANE : log Kow : 0,21 (OECD Guideline 107) PENTAFLUOROETHANE : log Kow : 1,48 (measured) 1,1,1,2-TETRAFLUOROETHANE : log Kow : 1,06 1,1,1-TRIFLUOROETHANE : log Kow : 1,49 (calculated)
Critical point :	Critical pressure: 4,39 MPa Critical temperature: 85,3 °C

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10. STABILITY AND REACTIVITY

Conditions to avoid :

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

Hazardous decomposition products :

At high temperature:
Thermal decomposition giving toxic and corrosive products :
Gaseous hydrogen fluoride (HF).
Carbon oxides

Further information :

The product is stable at ambient temperature
The gaseous product in presence of air can form, under certain conditions of temperature and pressure, a flammable mixture

11. TOXICOLOGICAL INFORMATION

Acute toxicity

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
Experimental effects on animals :
Practically not harmful by inhalation
LC50/4 h/rat: > 500000 ppm

Local effects

Skin contact :

Ejection of liquefied gas : frostbite possible

Eye contact :

Ejection of liquefied gas : frostbite possible

Sensitisation

Skin contact :

1,1,1,2-TETRAFLUOROETHANE :
Not a skin sensitizer
guinea pig

Repeated dose toxicity :

Studies of prolonged inhalation in animals have not shown sub-chronic toxic effects
DIFLUOROMETHANE :
Inhalation: 3 Months / rat

No Observed Adverse Effect Level (NOAEL): 50000 ppm

PENTAFLUOROETHANE :
Inhalation: 3 Months / rat
No Observed Adverse Effect Level (NOAEL): 50000 ppm

1,1,1-TRIFLUOROETHANE :
Inhalation: 3 Months / rat
No specific toxic effects
No Observed Adverse Effect Level (NOAEL): 40000 ppm

Specific effects

Genotoxicity :

According to available experimental data
Not genotoxic

Carcinogenicity :

1,1,1,2-TETRAFLUOROETHANE :
Inhalation/rat
Experimentation on animals has not shown clear evidence of carcinogenic effect

1,1,1-TRIFLUOROETHANE :
According to available experimental data
- By oral route/rat
Absence of carcinogenic effects

Reproductive toxicity

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Fertility :	1,1,1,2-TETRAFLUOROETHANE : Inhalation/mouse According to limited available data in animals : Absence of toxic effects on fertility
Foetal development :	- By inhalation/rabbit, rat According to available experimental data Absence of congenital malformations and embryotoxic effects in rodents at non-toxic doses for the mothers

12. ECOLOGICAL INFORMATION

According to its composition :
Not readily biodegradable

Mobility :	DIFLUOROMETHANE : In soils and sediments: Slight adsorption: log Koc 1,5 (calculated)
	PENTAFLUOROETHANE : In aqueous environment: rapid evaporation: (estimation)
	Volatilization 1/2 life time: 3,2 h In soils and sediments: Slight adsorption: log Koc 1,3 - 1,7
	1,1,1,2-TETRAFLUOROETHANE : In soils and sediments: Slight adsorption: log Koc 1,5 (calculated)
	Volatilization 1/2 life time: 8,6 - 16,7 y (calculated)

Persistence and degradability
In water :

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

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

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

in air :

DIFLUOROMETHANE :
Degradation by radicals OH :
Direct photolysis (Half-life) : 1.472 d

PENTAFLUOROETHANE :
Degradation in the troposphere :
Overall half-life time: 28,3 y
(estimation)

1,1,1,2-TETRAFLUOROETHANE :
Degradation in the atmosphere :
Direct photolysis (Half-life) : 8,6 - 16,7 y

1,1,1-TRIFLUOROETHANE :
Overall half-life time: 36 y

DIFLUOROMETHANE:
Global warming potential with respect to CO2 (time horizon 100 years)
Value: 650

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	Ozone depletion potential; ODP; (R-11 = 1) Value: 0
	PENTAFLUOROETHANE Global warming potential with respect to CO2 (time horizon 100 years) Value: 2.800
	Ozone depletion potential; ODP; (R-11 = 1) Value: 0
	NORFLURANE Global warming potential with respect to CO2 (time horizon 100 years) Value: 1.300
	Ozone depletion potential; ODP; (R-11 = 1) Value: 0
	1,1,1-TRIFLUOROETHANE: Global warming potential with respect to CO2 (time horizon 100 years) Value: 3.800 Ozone depletion potential; ODP; (R-11 = 1) Value: 0
Bioaccumulation :	DIFLUOROMETHANE : Practically not bioaccumulable log Kow : 0,21 (OECD Guideline 107)
	PENTAFLUOROETHANE : Practically not bioaccumulable log Kow : 1,48 (measured)
	1,1,1,2-TETRAFLUOROETHANE : Practically not bioaccumulable log Kow : 1,06
	1,1,1-TRIFLUOROETHANE : Not bioaccumulable. log Kow : 1,49 (calculated)
Aquatic toxicity Acute toxicity Fish :	1,1,1,2-TETRAFLUOROETHANE : Slightly harmful to fish LC50, 96 h (Oncorhynchus mykiss) : 450 mg/l
	1,1,1-TRIFLUOROETHANE : Slightly harmful to fish LC50, 96 h (Oncorhynchus mykiss) : > 40 mg/l
Aquatic invertebrates :	1,1,1,2-TETRAFLUOROETHANE : Slightly harmful to daphnia EC(l)50, 48 h : 980 mg/l
	1,1,1-TRIFLUOROETHANE : Slightly harmful to daphnia EC(l)50, 48 h : 300 mg/l
microorganisms :	1,1,1,2-TETRAFLUOROETHANE : Bacteria EC10, 6 h (Pseudomonas putida) : > 730 mg/l

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13. DISPOSAL CONSIDERATIONS

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

14. TRANSPORT INFORMATION

ADR

UN Number : 3163
Proper shipping name : LIQUEFIED GAS, N.O.S.
(1,1,1,2-TETRAFLUOROETHANE, PENTAFLUOROETHANE,
DIFLUOROMETHANE/TRIFLUOROETHANE, 1,2 ETHANE
50/25/15/10)

Class : 2
Classification Code : 2A
Hazard identification No : 20
Label : 2.2

RID

UN Number : 3163
Proper shipping name : LIQUEFIED GAS, N.O.S.
(1,1,1,2-TETRAFLUOROETHANE, PENTAFLUOROETHANE,
DIFLUOROMETHANE/TRIFLUOROETHANE, 1,2 ETHANE
50/25/15/10)

Class : 2
Classification Code : 2A
Hazard identification No : 20
Label : 2.2

IATA Cargo

UN Number : 3163
Proper shipping name : Liquefied gas, n.o.s.
(1,1,1,2-Tetrafluoroethane, Pentafluoroethane, Difluoromethane,
1.1.1-TRIFLUOROETHANE)

Class : 2.2
Label : 2.2

IATA Passenger

UN Number : 3163
Proper shipping name : Liquefied gas, n.o.s.
(1,1,1,2-Tetrafluoroethane, Pentafluoroethane, Difluoromethane,
1.1.1-TRIFLUOROETHANE)

Class : 2.2
Label : 2.2

IMDG

UN Number : 3163
Proper shipping name : LIQUEFIED GAS, N.O.S.
(1,1,1,2-TETRAFLUOROETHANE, PENTAFLUOROETHANE,
DIFLUOROMETHANE, 1.1.1-TRIFLUOROETHANE)

Class : 2.2
Label : 2.2
EmS Number : F-C, S-V
Marine Pollutant : no

15. REGULATORY INFORMATION

Full text of R-phrases referred to under sections 2 and 3

R12 Extremely flammable.

16. OTHER INFORMATION

Bibliography
. Matheson Gas Data Book - 7th Edition

17. EXCLUSION OF LIABILITY

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