AFROX
A Member of The Linde Group

MATERIAL SAFETY DATA SHEET (MSDS)

FORANE 427A

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

Date: April 2017 Version 2 Ref. no.: MS054

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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 111 185 or 0860 020 202
(24 hours)

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2. **HAZARDS IDENTIFICATION**

Most important hazards: Not readily biodegradable
Environmental Effects: Thermal decomposition giving toxic and corrosive products

Physical and chemical hazards: Decomposition products: See chapter 10
Additional information: This preparation is not classified as dangerous.

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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.

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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

If irritation persists, consult an ophthalmologist

Ingestion: Hospitalise

Protection of first-aiders: In case of insufficient ventilation, wear suitable respiratory equipment.

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
In enclosed areas: ventilate or wear a self-contained breathing apparatus (risk of anoxia) Remove all sources of ignition.
Do not smoke.

Environmental precautions: Avoid release to the environment. Refer to special instructions/ Safety data sheets.

7. HANDLING AND STORAGE

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

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: Ordinary steel
Materials to avoid: Alloys containing more than 2% of magnesium
Plastic materials

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

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

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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 temperatures: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 gazeous 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(I)50, 48 h : 980 mg/l

1,1,1-TRIFLUOROETHANE :
Slightly harmful to daphnia
EC(I)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

ECC Class: Extremely flammable.
National legislation OHSact and Regulations 85 of 1993.
Reference SANS 10234 and its supplement.

16. OTHER INFORMATION

Bibliography Matheson Gas Data Book - 7th Edition

EXCLUSION OF LIABILITY

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