

PRODUCT SAFETY INFORMATION

This Product Safety Information does not constitute a Safety Data Sheet and shall only be used as a source of information. The relevant Safety Data Sheet is available upon mail request to Productsafety.Information@solvay.com

SOLKANE® 404A

1. SUBSTANCE/PREPARATION IDENTIFICATION

Identification of the substance or the preparation

Product name	:	SOLKANE® 404A
Chemical characterisation	:	Mixture containing pentafluoroethane, 1,1,1-trifluoroethane and 1,1,1,2-tetrafluoroethane
Synonym(s)	:	R 404A
CAS Number	:	150743-07-0

2. COMPOSITION/INFORMATION ON INGREDIENTS

- ◆ **1,1,1-trifluoroethane**

CAS Number	:	420-46-2
EC Number (EINECS)	:	206-996-5
Symbols	:	F+
Phrases R	:	12
Concentration	:	52,00 %

- ◆ **Pentafluoroethane**

CAS Number	:	354-33-6
EC Number (EINECS)	:	206-557-8
Concentration	:	44,00 %

- ◆ **1,1,1,2-tetrafluoroethane**

CAS Number	:	811-97-2
EC Number (EINECS)	:	212-377-0
Concentration	:	4,00 %

3. HAZARDS IDENTIFICATION

- ◆ Gas (liquefied).
- ◆ Presents little hazard to human health and the environment.
- ◆ In case of decomposition, releases dangerous products.



4. FIRST-AID MEASURES

Effects

Inhalation

- ◆ At high concentrations, risk of narcosis.
- ◆ At high concentrations, risk of cardiac arrhythmia.
- ◆ At high concentrations, risk of asphyxia by lack of oxygen.

Eyes contact

- ◆ (gas)
- ◆ Slight irritation.
- ◆ (Liquefied gas)
- ◆ Severe eye irritation, watering, redness and swelling of the eyelids.
- ◆ Risk of burns (frostbite).

Skin contact

- ◆ (gas)
- ◆ Negligible
- ◆ (liquefied gas)
- ◆ Cold sensation followed by redness of the skin.
- ◆ Risk of frostbite.
- ◆ In case of repeated contact : dry and chapped skin, risk of chronic dermatitis.

Ingestion

- ◆ Impossible risk (gas).

First aid

Inhalation

- ◆ Remove the subject from the contaminated area.
- ◆ Oxygen or cardiopulmonary resuscitation if necessary.
- ◆ Consult with a physician in case of respiratory and nervous symptoms.

Eyes contact

- ◆ Keep eyelids open to allow evaporation of product.
- ◆ Flush eyes with running water for several minutes, while keeping the eyelids wide open.
- ◆ Consult with an ophthalmologist in case of persistent pain.

Skin contact

- ◆ Allow product to evaporate.
- ◆ Rinse with lukewarm running water.
- ◆ Consult with a physician in case of persistent pain or redness.

Ingestion

General recommendations

- ◆ Risk not possible (gas).

Medical treatment

General informations

- ◆ Do not give adrenergic drugs.



Inhalation

- ◆ Negligible

Eyes contact

- ◆ On the advice of the ophthalmologist.

Skin contact

- ◆ Usual treatment for burns.

Ingestion

- ◆ Negligible

5. FIRE-FIGHTING MEASURES

Common extinguishing means

- ◆ In case of fire in close proximity, all means of extinguishing are acceptable.

Inappropriate extinguishing means

- ◆ No restriction.

Specific hazards

- ◆ Formation of dangerous gas/vapours in case of decomposition (see section 10).
- ◆ Gas/vapours combustion possible in presence of air in very particular conditions (see section 9 and/or consult the producer).

Protective measures in case of intervention

- ◆ Evacuate all non-essential personnel.
- ◆ In all cases wear self-contained breathing apparatus.
- ◆ When intervention in close proximity wear acid resistant over suit.
- ◆ After intervention, proceed to clean the equipment (take a shower, remove clothing carefully, clean and check).
- ◆ Intervention only by capable personnel who are trained and aware of the hazards of the product.

Other precautions

- ◆ If safe to do so, remove the exposed containers, or cool with large quantities of water.
- ◆ As for any fire, ventilate and clean the rooms before re-entry.

6. ACCIDENTAL RELEASE MEASURES

Precautions

- ◆ Follow the protective measures given in section 5.
- ◆ Ventilate the premises.
- ◆ If safe to do so, without over exposing anyone, try to stop the leak.
- ◆ Keep away materials and products which are incompatible with the product (see section 10).

Cleanup methods

- ◆ Let the product evaporate.
- ◆ Prevent the product from entering sewers or confined places.

Precautions for protection of the environment

- ◆ Prevent discharges into the environment (atmosphere,...).



7. HANDLING AND STORAGE

Handling

- ◆ Operate in a well-ventilated area.
- ◆ Prevent product vapours decomposition from contacting hot spots.
- ◆ Prevent product vapours decomposition from electric arc action (welding).
- ◆ Use only equipment and materials which are compatible with the product.
- ◆ Keep away from ignition and heat sources.
- ◆ Keep away from reactive products (see section 10).

Storage

- ◆ In a ventilated, cool area.
- ◆ Keep away from heat sources.
- ◆ Keep away from reactive products (see section 10).

Other precautions

- ◆ Warn people about the dangers of the product.

Packaging

- ◆ Ordinary steel

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering controls

- ◆ Premises ventilation.
- ◆ Follow the protective measures given in section 7.
- ◆ Maintain employee exposures to levels below the applicable exposure limits.

Authorized limit values

- ◆ **1,1,1-trifluoroethane**
SAEL (Solvay) 2001
TWA = 500 ppm
- ◆ **Pentafluoroethane**
SAEL (Solvay) 2001
TWA = 1.000 ppm
- ◆ **1,1,1,2-tetrafluoroethane**
SAEL (Solvay) 2001
TWA = 1.000 ppm

Respiratory protection

- ◆ Minimum need if the local exhaust ventilation is adequate.
- ◆ Self-contained breathing apparatus in medium confinement/insufficient oxygen/in case of large uncontrolled emissions/in all circumstances when the mask and cartridge do not give adequate protection.
- ◆ Use only respiratory protection that conforms to international/ national standards.

Hand protection

- ◆ Protective gloves - chemical resistant:
- ◆ Recommended materials: Polyvinylalcohol

Eye protection

- ◆ Wear protective goggles for all industrial operations.
- ◆ If risk of splashing, chemical proof goggles/face shield.



Skin protection

- ◆ Apron/boots of neoprene if risk of splashing.

Other precautions

- ◆ Shower and eye wash stations.
- ◆ Gloves, overalls and boots have to be double layered (protection against cold temperature).
- ◆ Consult the industrial hygienist or the safety manager for the selection of personal protective equipment suitable for the working conditions.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance: pressurized liquefied gas.

Color/Colour: colorless/colourless

Odor/Odour: slightly ethereal.

Change of state

- ◆ Freezing point:
No data
- ◆ Boiling point/range (1013 mbars):
= -46,7 Cel

Flash point

- ◆ Negligible

Flammability

- ◆ No flammability limit in air
Remark: Non flammable gas.

Auto-flammability

- ◆ 728 Cel
(SOLKANE ® 507)

Vapor/vapour pressure

- ◆ = 10,98 bar
temperature 20 Cel
- ◆ = 23,03 bar
temperature 50 Cel

Density

- ◆ Specific gravity
= 1,05

Vapor/vapour density (air=1)

- ◆ = 3,45
temperature 20 Cel
(SOLKANE ® 507)

Solubility

- ◆ Water
0,09 %
(Data relative to SOLKANE ® 125)



pH

- ◆ neutral

Partition coefficient P (n-octanol/water)

- ◆ log P o/w 1,48
(Data relative to SOLKANE ® 125)

Viscosity

- ◆ Dynamic viscosity (liquid)
= 101,3 mPa.s
temperature 25 Cel

Decomposition temperature

- ◆ No data

Danger of explosion

- ◆ Remark: See also section 10

Oxidizing properties

- ◆ No data

10. STABILITY AND REACTIVITY

Stability

- ◆ Stable under certain conditions (see below).
- ◆ Decomposition produces dangerous gases, upon contact with flames or hot metallic surfaces.

Conditions to avoid

- ◆ Heat/Sources of heat

Materials to avoid

- ◆ Alkaline metals and their alloys

Hazardous decomposition products

- ◆ Hydrogen fluoride
- ◆ Fluorophosgene

Other information

- ◆ Contact with alkaline and alkaline-earth metals may provoke violent reactions or explosions.
- ◆ The vapor is heavier than air, disperses at ground level.

11. TOXICOLOGICAL INFORMATION

Acute toxicity

- ◆ Oral route, LD 50, not applicable
- ◆ Dermal route, LD 50, not applicable
- ◆ Inhalation, LC 50, 4 h, rat, > 80 % v/v air (Data relative to SOLKANE ® 125)
- ◆ Inhalation, LC 50, 4 h, Rat, > 60 % v/v air (Data relative to SOLKANE ® 143a)

Irritation

- ◆ No irritation signs noted during toxicity testing.(Data relative to SOLKANE ® 125/SOLKANE ® 143a)



Chronic toxicity

- ◆ Inhalation, after a single exposure, dog, ≥ 10 % v/v air, cardiac sensitization following adrenergic stimulation (Data relative to SOLKANE ® 125/SOLKANE ® 143a)
- ◆ Inhalation, after repeated exposure, rat, no observed effect (Data relative to SOLKANE ® 125/SOLKANE ® 143a)
- ◆ No mutagenic, teratogenic effects (Data relative to SOLKANE ® 125)
- ◆ No mutagenic, carcinogenic, teratogenic effects (Data relative to SOLKANE ® 143a)

Comments

- ◆ No appreciable toxic effect

12. ECOLOGICAL INFORMATION

Acute ecotoxicity

- ◆ Fishes, *Salmo gairdneri*, LC 50, 96 h, 450 mg/l
Conditions: semi-static test
(SOLKANE ® 134a)
- ◆ Fishes, *Salmo gairdneri*, NOEC, mortality, 96 h, 300 mg/l
Conditions: semi-static test
(SOLKANE ® 134a)
- ◆ Crustaceans, *Daphnia magna*, EC 50, 48 h, 980 mg/l
Conditions: static test
(SOLKANE ® 134a)
- ◆ Bacteria, *Pseudomonas sp.*, EC 10, growth, 6 h, > 730 mg/l
(SOLKANE ® 134a)

Chronic ecotoxicity

- ◆ Result: no data

Mobility

- ◆ Air, Henry's law constant (H) from 65 - 185 kPa.m³/mol
Result: considerable volatility
Conditions: 20 °C / calculated value
(SOLKANE ® 125/ SOLKANE ® 143a/ SOLKANE ® 134a)
- ◆ Soil/sediments, adsorption, log KOC from 1,3 - 2,32
Conditions: calculated value
(Data relative to SOLKANE ® 125/SOLKANE ® 143a)

Abiotic degradation

- ◆ Air, indirect photo-oxidation, t 1/2 from 10,9 - 28,2 year(s)
Conditions: sensitizer: OH radicals
Degradation's products: carbon dioxide / fluorhydric acid / trifluoroacetic acid
(SOLKANE ® 125/ SOLKANE ® 134a)
- ◆ Air, photolysis, ODP = 0
Result: no effect on stratospheric ozone
Reference value for CFC 11: ODP = 1. (SOLKANE ® 125/ SOLKANE ® 143a/ SOLKANE ® 134a)
- ◆ Air, greenhouse effect, GWP = 0,94
Reference value for CFC 11: GWP = 1. (Mixture SOLKANE ® 125/SOLKANE ® 143a/SOLKANE ® 134a)

Biotic degradation

- ◆ Aerobic, test: ready biodegradability/closed bottle, degradation = 4 %, 28 day(s)
Result: non-readily biodegradable
(Data relative to SOLKANE ® 125)



Potential for bioaccumulation

- ◆ Bioconcentration: $\log P_{o/w} = 1,48$
Result: non-bioaccumulable
Conditions: measured value
(Data relative to SOLKANE ® 125)

Comments

- ◆ Product is persistent in air (atmospheric lifetime: 15-65 years).
- ◆ Product is not significantly hazardous for the aquatic environment as:
 - ◆ . considerable volatility.

13. DISPOSAL CONSIDERATIONS

Waste treatment

- ◆ Dispose in compliance with local/federal and national regulations.
- ◆ It is recommended to contact the producer for recycling/recovery.

Packaging treatment

- ◆ To avoid treatments, as far as possible, use dedicated containers.

14. TRANSPORT INFORMATION

UN Number	3337
IATA Class:	2.2
Hazard label:	NON FLAMMABLE GAS
PSN: REFRIGERANT GAS R404A	
IMDG Class:	2.2
Hazard label:	COMPRESSED GAS NON FLAMMABLE
Placard:	3337
MFAG:	350
EmS:	2-06
IMDG Name: REFRIGERANT GAS R404A	
ADR/ADNR Class	2, 2° A
Hazard label:	2
Placard:	20/3337
ADR/RID Name: REFRIGERANT GAS R404A	
RID Class:	2, 2° A
Hazard label:	2 + 13
Placard:	20/3337
ADR/RID Name: REFRIGERANT GAS R404A	

15. REGULATORY INFORMATION

EC Labelling

- ◆ Not classified according Directive 88/379/EEC.



- ◆ This preparation doesn't contain any product classified dangerous for the environment (see section 12).

16. OTHER INFORMATION

The information given corresponds to the current state of our knowledge and experience of the product, and is not exhaustive. This applies to product which conforms to the specification, unless otherwise stated. In this case of combinations and mixtures one must make sure that no new dangers can arise. In any case, the user is not exempt from observing all legal, administrative and regulatory procedures relating to the product, personal hygiene, and protection of human welfare and the environment.

