

SAFETY DATA SHEET

(according to Directive 2001/58/EC)

SOLKANE ® 365 mfc

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

1.1. Identification of the substance or preparation

Product name : SOLKANE ® 365 mfc
Chemical name : 1,1,1,3,3-pentafluorobutane
Synonym(s) : Pentafluorobutane, HFC-365mfc
Formula: : C₄H₅F₅
Molecular Weight : 148

1.2. Use of the substance/preparation

Recommended uses : - Foaming agents
- Solvents

1.3. Company/undertaking identification

Address : SOLVAY FLUOR GmbH
HANS-BOECKLER-ALLEE 20
D- 30173 HANNOVER

Tel. : +495118570

Fax : +495118572146

1.4. Emergency telephone

Tel. : **80076767600 (Europe)**
498945560321 (Europe)

2. COMPOSITION/INFORMATION ON INGREDIENTS

1,1,1,3,3-pentafluorobutane

CAS Number : 406-58-6
ELINCS Number : 430-250-1
Symbols : F
Phrases R : 11
Concentration : **>= 99.50 %**

3. HAZARDS IDENTIFICATION

- Substance classified as dangerous according to Directive 67/548/EEC.
- Highly flammable
- In case of decomposition, releases hydrogen fluoride.

4. FIRST-AID MEASURES

4.1. 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.

4.2. Eyes contact

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

4.3. Skin contact

- Wash the affected skin with soap and water.
- Consult with a physician in case of persistent pain or redness.

4.4. Ingestion

General recommendations

- Unknown symptoms : consult with a physician for advice.

If the subject is completely conscious:

- Rinse mouth and administer fresh water.

If the subject is unconscious:

- Not applicable

5. FIRE-FIGHTING MEASURES

5.1. Suitable extinguishing media

- Powder
- Foam, AFFF.
- CO2

5.2. Unsuitable extinguishing media

- Water

5.3. Special exposure hazards

- Highly flammable (see section 9).
- Formation of dangerous gas/vapours in case of decomposition (see section 10).
- Gas/vapours are heavier than air and so may travel along the ground; remote ignition possible.
- Gas/vapours explosion possible in presence of air.

5.4. Protective measures in case of intervention

- Evacuate all non-essential personnel.
- Intervention only by capable personnel who are trained and aware of the hazards of the product.
- Wear self contained breathing apparatus when in close proximity or in confined spaces.
- 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).

5.5. Other precautions

- If safe to do so, remove the exposed containers, or cool with large quantities of water.
- Approach from upwind.
- Avoid propagating the fire, when directing the extinguishing means in a jet on the surface of the burning liquid.
- After the fire, proceed rapidly to clean the surfaces exposed to the fumes in order to limit the damage to the equipment.
- As for any fire, ventilate and clean the rooms before re-entry.

6. ACCIDENTAL RELEASE MEASURES

6.1. Personal precautions

- Follow the protective measures given in section 5.
- Follow the protective measures given in section 8.



- If safe to do so, without over exposing anyone, try to stop the leak.
- Eliminate all sources of ignition, and do not generate flames or sparks.
- Keep away materials and products which are incompatible with the product (see section 10).
- Approach from upwind.
- Disperse gas/vapours with water spray.
- Protect intervention team with water spray.

6.2. Environmental precautions

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

6.3. Methods for cleaning up

- If possible, dam large quantities of liquid with sand or earth.
- Prevent the product from entering sewers or confined places.
- Collect the product with suitable means.
- Place everything into a closed, labelled container compatible with the product.
- Store the product in a safe and isolated place.
- Clean the area with large quantities of water.
- For disposal methods, refer to section 13.

7. HANDLING AND STORAGE

7.1. Handling

- Carry out industrial operations in closed piping circuits and equipment.
- Handle small quantities under a lab hood.
- Operate in a well-ventilated area.
- Do not use tools that produce sparks.
- Prevent any product decomposition from contacting hot spots.
- 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).

7.2. Storage

- In a ventilated, cool area.
- Keep away from ignition and heat sources.
- Keep away from reactive products (see section 10).
- Containment bund around storage containers and transfer installation.
- For bulk storage, consult the producer.

7.3. Specific use(s)

- For any particular use, please contact the supplier.

7.4. Packaging

- Steel

7.5. Other precautions

- No open flames or sparks, no smoking.
- Provide electrical equipment safe for hazardous locations.
- Grounded equipment.
- Prevent electrostatic discharges.
- Warn people about the dangers of the product.
- Follow the protective measures given in section 8.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1. Exposure limit values

1,1,1,3,3-pentafluorobutane
TLV (ACGIH-USA)



Result: Negligible

8.2. Exposure controls

- Premises ventilation.
- Provide local ventilation suitable for the emission risk.
- Follow the protective measures given in section 7.

8.2.1. Occupational exposure controls

8.2.1.1. *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.

8.2.1.2. *Hand protection*

- Protective gloves - chemical resistant:
- Recommended materials: Neoprene

8.2.1.3. *Eye protection*

- Wear protective goggles for all industrial operations.

8.2.1.4. *Skin protection*

- Overalls
- Apron/boots of butyl rubber if risk of splashing.

8.2.1.5. *Other precautions*

- Shower and eye wash stations.
- Consult the industrial hygienist or the safety manager for the selection of personal protective equipment suitable for the working conditions.
- Do not smoke, eat and drink in the working area.

8.2.2. Environmental exposure controls

- Respect local/federal and national regulations for aqueous emissions (see section 15).

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1. General information

Appearance	: volatile liquid
Color/Colour	: colorless/colourless
Odor/Odour	: ethereal

9.2. Important health, safety and environmental information

pH	: = 6 <i>Concentration: 1.7 g/l</i>
Boiling point	: 40 °C
Flash point	: =< -27 °C <i>Remark: Highly flammable</i> <i>Method: DIN 51755 T2</i>
Flammability	: <u>Upper limit:</u> 13.3 %(V) <u>Lower limit:</u> 3.6 %(V)
Explosive properties	: <i>Remark: Explosion possible with gas/vapour and air mixtures</i> (see also section 10)



Vapor/vapour pressure	:	= 43.3 kPa Temperature: 20 °C
Density	:	<u>Specific gravity</u> : = 1.27
Solubility	:	Soluble in Water 5 g/l Temperature: 20 °C
Partition coefficient: n-octanol/water	:	<u>log P o/w</u> : = 1.6 Method: Measured value
Viscosity	:	= 0.4 mPa.s Temperature: 25 °C
Vapor/vapour density (air=1)	:	= 5.11

9.3. Other information

Auto-flammability	:	= 580 °C
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10. STABILITY AND REACTIVITY

10.1. Conditions to avoid

- Heat/Sources of heat

10.2. Materials to avoid

- Oxidizing agents
- Metallic powders
- Alkaline metals

10.3. Hazardous decomposition products

- Hydrogen fluoride
- Fluorophosgene

10.4. Other information

- The vapor is heavier than air, disperses at ground level.

11. TOXICOLOGICAL INFORMATION

11.1. Toxicological datas

Acute toxicity

- Oral route, LD 50, rat, > 2,000 mg/kg
- Inhalation, LC 50, 4 h, rat, > 10 %

Irritation

- Rabbit, non irritant (skin)
- Rabbit, slightly irritant (eyes)

Sensitization

- Guinea Pig, Non sensitizing (skin)

Chronic toxicity

- Inhalation, after repeated exposure, rat, 30,000 ppm, observed effect (body weight)
- No mutagenic effect



- Inhalation, after a single exposure, dog, $\geq 7.5\%$, cardiac sensitization following adrenergic stimulation

Comments

- No appreciable toxic effect

11.2. Health effects

Inhalation

- No reported cases of intoxication in man.
- Risk of moderate consequences experimentally observed or under certain conditions.
- At high concentrations, risk of narcosis.
- At high concentrations, risk of asphyxia by lack of oxygen.

Eyes contact

- Slight irritation.

Skin contact

- In case of repeated contact: dry and chapped skin.

Ingestion

- No data available for humans.

12. ECOLOGICAL INFORMATION

12.1. Ecotoxicity

Acute ecotoxicity

- Fishes, Brachydanio rerio, LC 50, 96 h, > 200 mg/l
- Crustaceans, Daphnia magna, NOEC, 48 h, > 200 mg/l
- Algae, Selenastrum capricornutum, NOEC, 72 h, $= 113$ mg/l
- Terrestrial plants, NOEC, 1000 ppm

12.2. Mobility

- Air, Henry's law constant (H) ca. 3.8 kPa.m³/mol
Result: considerable volatility
Conditions: 20 °C / calculated value
- Soil/sediments, adsorption, log KOC ca. 1.8
Conditions: calculated value

12.3. Persistence and degradability

Abiotic degradation

- Air, indirect photo-oxidation, t 1/2 ca. 7.04 year(s)
- Air, photolysis, ODP = 0
Result: no effect on stratospheric ozone
Reference value for CFC 11: ODP = 1 .
- Air, greenhouse effect, GWP = 890
Reference value for carbon dioxide: GWP = 1 .

Biotic degradation

- Aerobic, test ready biodegradability/closed bottle, 13% , 28 day(s)
Result: non-readily biodegradable

12.4. Bioaccumulative potential

- Bioconcentration: log Po/w ca. 1.61
Result: improbable bioaccumulation
Conditions: measured value

12.5. Other adverse effects

- Study in progress

12.6. Comments

- Product is persistent in air (atmospheric lifetime: $16 - 19$ years).
- Hazard for the aquatic environment is limited due to product properties:



- . considerable volatility.
- . low bioaccumulation potential.

13. DISPOSAL CONSIDERATIONS

13.1. Waste treatment

- Dispose in compliance with local/federal and national regulations.
- It is recommended to contact the producer for recycling/recovery.
- Or
- Send the product to an authorized industrial waste incinerator.
- The incinerator must be equipped with a system for the neutralisation of HF.

13.2. Packaging treatment

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

14. TRANSPORT INFORMATION

UN Number	1993
IATA Class:	3
Packing group:	II
Hazard label:	FLAMMABLE LIQUID
PSN: FLAMMABLE LIQUID, N.O.S. (PENTAFLUOROBUTANE)	
IMDG Class:	3
Packing group:	II
Hazard label:	FLAMMABLE LIQUID
Placard:	1993
EmS:	F-E, S-E
IMDG Name: FLAMMABLE LIQUID, N.O.S. (PENTAFLUOROBUTANE)	
ADR/ADNR Class	3
Packing group:	II
Hazard label:	3
Placard:	33/1993
Special provisions:	640C
ADR/RID Name: FLAMMABLE LIQUID, N.O.S. (PENTAFLUOROBUTANE)	
RID Class:	3
Packing group:	II
Hazard label:	3
Placard:	33/1993
Special provisions:	640C
ADR/RID Name: FLAMMABLE LIQUID, N.O.S. (PENTAFLUOROBUTANE)	

15. REGULATORY INFORMATION

15.1. EC Labelling

- Name of dangerous product(s) (to indicate on the label): 1,1,1,3,3-pentafluorobutane
- Labelling according to Article 6 of Dir. 92/32/EEC.

Symbols	F	Highly flammable
Phrases R	11	Highly flammable.
Phrases S	16	Keep away from sources of ignition --- No smok-



ing.

16. OTHER INFORMATION

16.1. Reason for update

- Update:
- sections 9 - 16

This MSDS is intended for only the selected countries to which it is applicable. For example, this MSDS is not intended for use nor distribution within North America. You should contact Solvay America company representative for the official North America MSDS.

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.

