

Safety data sheet

Hydrogen fluoride, anhydrous

Creation date : 28.01.2005
Revision date : 09.05.2012

Version : 1.4

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SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1. Product identifier

Product name

Hydrogen fluoride, anhydrous

EC No (from EINECS): 231-634-8

CAS No: 7664-39-3

Index-Nr. 009-002-00-6

Chemical formula HF

REACH Registration number:

01-2119458860-33

1.2. Relevant identified uses of the substance or mixture and uses advised against

Relevant identified uses

Industrial and professional. Perform risk assessment prior to use.

Uses advised against

Consumer use.

1.3. Details of the supplier of the safety data sheet

Company identification

BOC, Priestley Road, Worsley, Manchester M28 2UT

E-Mail Address ReachSDS@boc.com

1.4. Emergency telephone number

Emergency phone numbers (24h): 0800 111 333

SECTION 2: Hazards identification

2.1. Classification of the substance or mixture

Classification acc. to Regulation (EC) No 1272/2008/EC (CLP/GHS)

Acute Tox. 2 - Fatal if inhaled.

Acute Tox. 1 - Fatal in contact with skin.

Acute Tox. 2 - Fatal if swallowed.

Skin Corr. 1A - Causes severe skin burns and eye damage.

EUH071 - Corrosive to the respiratory tract.

Classification acc. to Directive 67/548/EEC & 1999/45/EC

T+; R26/27/28 | C; R35

Very toxic by inhalation, in contact with skin and if swallowed.

Causes severe burns (eyes, respiratory system and skin).

Risk advice to man and the environment

Liquid.

2.2. Label elements

- Labelling Pictograms



- Signal word

Danger

- Hazard Statements

H330

Fatal if inhaled.

H310

Fatal in contact with skin.

H300

Fatal if swallowed.

H314

Causes severe skin burns and eye damage.

EUH071

Corrosive to the respiratory tract.

- Precautionary Statements

Precautionary Statement Prevention

P260

Do not breathe gas, vapours.

P262

Do not get in eyes, on skin, or on clothing.

P280

Wear protective gloves/protective clothing/eye protection/face protection.

Precautionary Statement Response

P304+P340+P315

IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. Get immediate medical advice/attention.

P305+P351+P338+P315

IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Get immediate medical advice/attention.

P303+P361+P353+P315

IF ON SKIN (or hair): Remove / Take off immediately all contaminated clothes. Rinse skin with water/shower. Get immediate medical advice/attention.

Precautionary Statement Storage

P403

Store in a well-ventilated place.

P405

Store locked up.

Precautionary Statement Disposal

None.

2.3. Other hazards

None.

SECTION 3: Composition/information on ingredients

Substance / Mixture: Substance.

3.1. Substances

Hydrogen fluoride, anhydrous

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Contains no other components or impurities which will influence the classification of the product.

3.2. Mixtures

Not applicable.

SECTION 4: First aid measures

4.1. Description of first aid measures

First Aid General Information:

Remove victim to uncontaminated area wearing self contained breathing apparatus. Keep victim warm and rested. Call a doctor. Apply artificial respiration if breathing stopped.

First Aid Inhalation:

Remove victim to uncontaminated area wearing self contained breathing apparatus. Keep victim warm and rested. Call a doctor. Apply artificial respiration if breathing stopped.

First Aid Skin / Eye:

In case of skin contact, wearing rubber gloves rub 2.5% calcium gluconate gel continuously into the affected area for 1.5 hours or until further medical care is available. Remove contaminated clothing. Drench affected area with water for at least 15 minutes. Immediately flush eyes thoroughly with water for at least 15 minutes.

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First Aid Ingestion:

Rinse mouth with water, do not induce vomiting, call a doctor.

4.2. Most important symptoms and effects, both acute and delayed

Prolonged exposure to small concentrations may result in pulmonary oedema. May cause severe chemical burns to skin and cornea. Suitable first-aid treatment should be immediately available. Seek medical advice before using product. Delayed adverse effects possible.

4.3. Indication of any immediate medical attention and special treatment needed

Treat with a corticosteroid spray as soon as possible after inhalation. Obtain medical assistance.

SECTION 5: Fire fighting measures

5.1. Extinguishing media

Suitable extinguishing media

Dry powder. Carbon dioxide. Foam. Water fog. Use water spray or fog to control fire fumes.

Unsuitable extinguishing media

Do not use a solid water stream.

5.2. Special hazards arising from the substance or mixture

Specific hazards

Exposure to fire may cause containers to rupture/explode.

Hazardous combustion products

None that are more toxic than the product itself.

5.3. Advice for fire-fighters

Specific methods

Move container away or cool with water from a protected position. If possible, stop flow of product. Prevent water used in emergency cases from entering sewers and drainage systems.

Special protective equipment for fire-fighters

Gas tight chemically protective clothing (Type 1) in combination with self contained breathing apparatus.

Guideline:

EN 943-2:2002: Protective clothing against liquid and gaseous chemicals, aerosols and solid particles. Performance requirements for gas-tight (Type 1) chemical protective suits for emergency teams (ET).

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

Evacuate area. Use self-contained breathing apparatus and chemically protective clothing. Ensure adequate air ventilation. Monitor concentration of released product. Prevent from entering sewers, basements and workpits, or any place where its accumulation can be dangerous.

6.2. Environmental precautions

Try to stop release. Reduce vapour with fog or fine water spray.

6.3. Methods and material for containment and cleaning up

Ventilate area. Hose down area with water. Wash contaminated equipment or sites of leaks with copious quantities of water.

6.4. Reference to other sections

See also sections 8 and 13.

SECTION 7: Handling and storage

7.1. Precautions for safe handling

Only experienced and properly instructed persons should handle gases under pressure. The substance must be handled in accordance with good industrial hygiene and safety procedures. Use only properly specified equipment which is suitable for this product, its supply pressure and temperature. Contact your supplier if in doubt. Avoid exposure, obtain special instructions before use. Do not smoke while handling product. Ensure the complete system has been (or is regularly) checked for leaks before use. Installation of a cross purge assembly between the container and the regulator is recommended. Purge system with dry inert gas (e.g. helium or nitrogen) before product is introduced and when system is placed out of service. Avoid suckback of water, acid and alkalis. Protect containers from physical damage; do not drag, roll, slide or drop. Refer to supplier's handling instructions. Do not allow backfeed into the container. When moving containers, even for short distances, use appropriate equipment eg. trolley, hand truck, fork truck etc. Leave valve protection caps in place until the container has been secured against either a wall or bench or placed in a container stand and is ready for use. If user experiences any difficulty operating container valve discontinue use and contact supplier. Never attempt to repair or modify container valves or safety relief devices. Damaged valves should be reported immediately to the supplier. Keep container valve outlets clean and free from contaminants particularly oil and water. Replace valve outlet caps or plugs and container caps where supplied as soon as container is disconnected from equipment. Close container valve after each use and when empty, even if still connected to equipment. Never attempt to transfer product from one container to another. Never use direct flame or electrical heating devices to raise the pressure of a container. Do not remove or deface labels provided by the supplier for the identification of the container contents.

7.2. Conditions for safe storage, including any incompatibilities

Keep container below 50°C in a well ventilated place. Secure cylinders to prevent them from falling. Observe all regulations and local requirements regarding storage of containers. Cylinders should be stored in the vertical position and properly secured to prevent falling over. Stored containers should be periodically checked for general conditions and leakage. Container valve guards or caps should be in place. Store containers in location free from fire risk and away from sources of heat and ignition. Keep away from combustible materials. Containers should not be stored in conditions likely to encourage corrosion. EIGA recommends a pressure check be conducted every two years for continued storage of unused product.

Excess pressure must be vented through an appropriate scrubber system. If user wishes to return cylinder after two years, please contact your supplier for return.

7.3. Specific end use(s)

None.

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

Exposure limit value

Value type	value	Note
TLV (ACGIH)	3 ppm	ACGIH 1995 - 1996
Great Britain - LTEL	1,8 ppm	EH 40/07
Great Britain - STEL	3 ppm	EH 40/07

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Derived No Effect Levels

Type	Exposure	Value	Population	Effects
DNEL	Short term inhalation	2,5 mg/m3	Workers	Local
DNEL	Short term inhalation	2,5 mg/m3	Workers	Systemic
DNEL	Long term inhalation	1,5 mg/m3	Workers	Local
DNEL	Long term inhalation	1,5 mg/m3	Workers	Systemic

Predicted No Effect Concentrations

Type	Environmental Compartment	Value
PNEC	Fresh water	0,9 mg/l
PNEC	Marine	0,9 mg/l
PNEC	Fresh water sediment	0,766 mg/kg dw
PNEC	Soil	11 mg/l

8.2. Exposure controls

Appropriate engineering controls

A risk assessment should be conducted and documented in each work area to assess the risks related to the use of the product and to select the PPE that matches the relevant risk. The following recommendations should be considered. Product to be handled in a closed system and under strictly controlled conditions. Keep concentrations well below occupational exposure limits. Consider work permit system e.g. for maintenance activities. Preferably use permanent leak-tight connections (eg. welded pipes). Systems under pressure should be regularly checked for leakages. Provide adequate general or local ventilation. Gas detectors should be used when toxic quantities may be released.

Personal protective equipment

Eye and face protection

Protect eyes, face and skin from liquid splashes. Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Wear a face-shield when transfilling and breaking transfer connections. Safety eyewear, goggles or face-shield to EN166 should be used to avoid exposure to liquid splashes. Wear eye protection to EN 166 when using gases. Full-face mask recommended

Guideline:

EN 136 Respiratory protective devices. Full face masks. Requirements, testing, marking

Skin protection

Hand protection

Advice: Wear working gloves and safety shoes while handling containers., Chemically resistant gloves complying with EN 374 should be worn at all times when handling chemical products if a risk assessment indicates this is necessary.

Material: Fluoroelastomer (FKM)

Min. Breakthrough time: 480 min

Glove thickness: 0,7 mm

Guideline: EN 374-1/2/3 Protective gloves against chemicals and micro-organisms.

Body protection

Protect eyes, face and skin from contact with product. Keep suitable chemically resistant protective clothing readily available for emergency use. Personal protective equipment for the body should be selected based on the task being performed and the risks involved.

Guideline:

EN 943: Protective clothing against liquid and gaseous chemicals, including liquid aerosols and solid particles.

Other protection

Wear working gloves and safety shoes while handling containers. EN ISO 20345 Personal protective equipment - Safety footwear.

Respiratory protection

Keep self contained breathing apparatus readily available for emergency use., Use SCBA in the event of high concentrations, The selection of the Respiratory Protective Device (RPD) must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected RPD., When allowed by a risk assessment Respiratory Protective Equipment (RPE) may be used.

Guideline:

EN 136 Respiratory protective devices. Full face masks. Requirements, testing, marking

Material:

Filter E

Guideline:

EN 14387: Respiratory protective devices. Gas filter(s) and combined filter(s). Requirements, testing, marking

Environmental Exposure Controls

Specific risk management measures are not required beyond good industrial hygiene and safety procedures. Refer to local regulations for restriction of emissions to the atmosphere. See section 13 for specific methods for waste gas treatment.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

General information

Appearance/Colour: Colourless gas. Gives off white fumes in moist air.

Odour: Pungent

Odour threshold:

Odour threshold is subjective and inadequate to warn for over exposure.

pH value: If dissolved in water pH-value will be affected.

Melting point: -83 °C

Boiling point: 19,5 °C

Flash point: Not applicable for gases and gas mixtures.

Evaporation rate:

Not applicable for gases and gas mixtures.

Flammability range: Non flammable.

Vapour Pressure 20 °C: 1 bar

Relative density, gas (Air=1): 2,6

Solubility in water: completely

Partition coefficient: n-octanol/water:

Not applicable.

Autoignition temperature: Not applicable.

Molecular weight: 20,01 g/mol

Critical temperature: 188 °C

Relative density, liquid (Water=1): 0,97

9.2. Other information

Gas/vapour heavier than air. May accumulate in confined spaces, particularly at or below ground level.

SECTION 10: Stability and reactivity

10.1. Reactivity

Unreactive under normal conditions.

10.2. Chemical stability

Stable under normal conditions.

10.3. Possibility of hazardous reactions

Exothermic reaction.

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10.4. Conditions to avoid

Avoid moisture in installation systems.

10.5. Incompatible materials

Reacts with most metals in the presence of moisture, liberating hydrogen, an extremely flammable gas. With water causes rapid corrosion of some metals. Moisture. Reacts with water to form corrosive acids. May react violently with alkalis. For material compatibility see latest version of ISO-11114.

10.6. Hazardous decomposition products

Under normal conditions of storage and use, hazardous decomposition products should not be produced.

SECTION 11: Toxicological information

11.1. Information on toxicological effects

Acute oral toxicity

Value: LD100

Species: Guinea-pig

Value in standard unit mg/kg: 80 mg/kg (2% solution)

Acute inhalation toxicity

Value: LC50

Species: Rat

Exposure time: 4 h

Value in non-standard unit: 483 ppm

Acute dermal toxicity

Value: NOEC

Species: Rabbit

Exposure time: 1 min

Value in non-standard unit: 2%(m) solution

Value: NOEC

Species: Rabbit

Exposure time: 30 min

Value in non-standard unit: 0,01%(m) solution

Skin irritation

Species: Rabbit

Severe corrosion to the skin at high concentrations.

Eye irritation

Risk of serious damage to eyes.

Sensitization

This substance is not classified as a sensitizer.

Repeated dose toxicity

Severe corrosion to the respiratory tract at high concentrations.

Genetic toxicity in vitro

Negative.

Genetic toxicity in vivo

Result: Negative.

Assessment carcinogenicity

May have carcinogenic effect.

Toxicity to reproduction/fertility

Species: Rat

Value type: NOAEL

Value: 10 mg/kg bw/day

Method: Read across

Assessment toxicity to reproduction

Toxic effect

Assessment teratogenicity

Toxic effect

Other relevant toxicity information

Absorption of excessive F- can result in acute systemic fluorosis with hypocalcaemia interference with various metabolic functions and organ damage (heart, liver, kidneys).

Experiences with human exposure

Severe corrosion to the respiratory tract at high concentrations.

Specific Target Organ Toxicity (STOT) - Single Exposure

No data available.

Specific Target Organ Toxicity (STOT) - Repeated Exposure

Value type: LOAEL

Value: 50 ppm

Species: Mouse

Organ: Skeletal system.

Read across

Value type: NOAEL

Value: 880 µg/kg

Species: Rat

Organ: Skeletal system

Read across

SECTION 12: Ecological information

12.1. Toxicity

Harmful to aquatic life with long lasting effects. Toxic to water organisms. May cause pH changes in aqueous ecological systems.

Acute and prolonged toxicity fish

Species: Rainbow trout (*Oncorhynchus mykiss*)

Exposure time: 96 h

Value type: LC50

Value in standard unit mg/l: 51 mg/l

Acute toxicity aquatic invertebrates

Species: Water flea (*Daphnia magna*)

Exposure time: 48 h

Value type: EC50

Value in standard unit mg/l: 97 mg/l

Test type: Fresh water

Species: Crustaceans

Exposure time: 96 h

Value type: EC50

Value in standard unit mg/l: 10,5 mg/l

Toxicity aquatic plants

Test type: Salt water

Species: Algae

Exposure time: 96 h

Value in standard unit mg/l: 43 mg/l

Chronic toxicity fish

Species: Rainbow trout (*Oncorhynchus mykiss*)

Exposure time: 21 d

Value type: LC50

Value in standard unit mg/l: 3,7 mg/l

Chronic toxicity aquatic invertebrates

Species: Water flea (*Daphnia magna*)

Exposure time: 21 d

Value type: NOEC

Value in standard unit mg/l: 3,7 mg/l

12.2. Persistence and degradability

Abiotic:

Air - neutralisation by natural alkalinity.

Water/soil - ionization/neutralisation of inorganic and organic materials.

Water/soil - complexation/precipitation of inorganic materials.

Degradation products: aluminum/iron/calcium/phosphate complexes and/or precipitates as a function of pH (Fluorides).

Biodegradation

Methods for determining the biological degradability are not applicable for inorganic substances

12.3. Bioaccumulative potential

Bioaccumulation

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Fluoride accumulates in aquatic organisms predominantly in the exoskeleton of crustacea and in the skeleton of fish; no accumulation was reported for edible tissue

12.4. Mobility in soil

Adsorption on mineral soil constituents.

Transport between environmental compartments

Medium: Air

Mobility in aerosol form

Medium: Water

Considerable mobility, Considerable solubility

12.5. Results of PBT and vPvB assessment

Not classified as PBT or vPvB.

12.6. Other adverse effects

Not applicable.

SECTION 13: Disposal considerations

13.1. Waste treatment methods

Do not discharge into any place where its accumulation could be dangerous. Contact supplier if guidance is required. Gas may be scrubbed in alkaline solution under controlled conditions to avoid violent reaction. Must not be discharged to atmosphere. Refer to the EIGA code of practice (Doc.30 "Disposal of Gases", downloadable at <http://www.eiga.org>) for more guidance on suitable disposal methods.

Gases in pressure containers (including halons) containing dangerous substances

EWC Nr. 16 05 04*

SECTION 14: Transport information

ADR/RID

14.1. UN number

1052

14.2. UN proper shipping name

Hydrogen fluoride, anhydrous

14.3. Transport hazard class(es)

Class: 8

Classification Code: CT1

Labels: 8, 6.1

Hazard number: 886

Tunnel restriction code: (C/D)

Emergency Action Code: 2XE

14.4. Packing group (Packing Instruction)

P200

14.5. Environmental hazards

None.

14.6. Special precautions for user

None.

IMDG

14.1. UN number

1052

14.2. UN proper shipping name

Hydrogen fluoride, anhydrous

14.3. Transport hazard class(es)

Class: 8

Labels: 8, 6.1

EmS: F-C, S-U

14.4. Packing group (Packing Instruction)

P200

14.5. Environmental hazards

None.

14.6. Special precautions for user

None.

14.7. Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code

Not applicable.

IATA

14.5. Environmental hazards

None.

14.6. Special precautions for user

None.

Other transport information

Avoid transport on vehicles where the load space is not separated from the driver's compartment. Ensure vehicle driver is aware of the potential hazards of the load and knows what to do in the event of an accident or an emergency. Before transporting product containers ensure that they are firmly secured. Ensure that the container valve is closed and not leaking. Ensure that the valve outlet cap nut or plug (where provided) is correctly fitted. Ensure that the valve protection device (where provided) is correctly fitted. Ensure adequate ventilation. Ensure compliance with applicable regulations.

SECTION 15: Regulatory information

15.1. Safety, health and environmental regulations/legislation specific for the substance or mixture

Seveso Directive 96/82/EC: Listed

Other regulations

Management of Health and Safety at Work Regulations (1999 No. 3242)

The Regulatory Reform (Fire Safety) Order 2005 (2005 No. 1541)

Control of Substances Hazardous to Health Regulations (COSHH, 2002 No. 2677)

Provision and Use of Work Equipment Regulations (PUWER, 1998 No. 2306)

Personal Protective Equipment Regulations (1992 No. 2966)

Control of Major Accident Hazards Regulations (COMAH, 1999 No. 743)

Chemical Hazards Information and Packaging for Supply (CHIP, 1994 No. 3247)

Pressure Systems Safety Regulations (PER, 2000 No. 128)

This Safety Data Sheet has been produced to comply with Regulation (EU) 453/2010.

15.2. Chemical safety assessment

CSA has been carried out.

SECTION 16: Other information

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Ensure all national/local regulations are observed. Ensure operators understand the toxicity hazard. Users of breathing apparatus must be trained. Before using this product in any new process or experiment, a thorough material compatibility and safety study should be carried out.

Advice

Whilst proper care has been taken in the preparation of this document, no liability for injury or damage resulting from its use can be accepted. Details given in this document are believed to be correct at the time of going to press.

Further information

Note:

When using this document care should be taken, as the decimal sign and its position complies with rules for the structure and drafting of international standards, and is a comma on the line.

As an example 2,000 is two (to three decimal places) and not two thousand, whilst 1.000 is one thousand and not one (to three decimal places).

References

Various sources of data have been used in the compilation of this SDS, they include but are not exclusive to:

European Chemical Agency: Information on Registered Substances
<http://apps.echa.europa.eu/registered/registered-sub.aspx#search>
European Chemical Agency: Guidance on the Compilation of Safety Data Sheets.

Matheson Gas Data Book, 7th Edition.

European Industrial Gases Association (EIGA) Doc. 169/11
Classification and Labelling guide.

National Institute for Standards and Technology (NIST) Standard Reference Database Number 69

The European Chemical Industry Council (CEFIC) ERICards.

ISO 10156:2010 Gases and gas mixtures -- Determination of fire potential and oxidizing ability for the selection of cylinder valve outlets.

The ESIS (European chemical Substances 5 Information System) platform of the former European Chemicals Bureau (ECB) ESIS (<http://ecb.jrc.ec.europa.eu/esis/>).

United States of America's National Library of Medicine's toxicology data network TOXNET (<http://toxnet.nlm.nih.gov/index.html>)

International Programme on Chemical Safety (<http://www.inchem.org/>)

Agency for Toxic Substances and Diseases Registry (ATSDR) (<http://www.atsdr.cdc.gov/>)

Threshold Limit Values (TLV) from the American Conference of Governmental Industrial Hygienists (ACGIH).

Substance specific information from suppliers.
EH40 (as amended) Workplace exposure limits.

End of document