

## Chemical Safety Data Sheet MSDS / SDS

## Hydrogen fluoride

Revision Date:2024-12-21 Revision Number:1

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

## Product identifier

Product name : Hydrogen fluoride  
CBnumber : CB8380315  
CAS : 7664-39-3  
EINECS Number : 231-634-8  
Synonyms : HF,Hydrofluoric Acid

## Relevant identified uses of the substance or mixture and uses advised against

Relevant identified uses : For R&D use only. Not for medicinal, household or other use.  
Uses advised against : none

## Company Identification

Company : Chemicalbook  
Address : Building 1, Huihuang International, Shangdi 10th Street, Haidian District, Beijing  
Telephone : 400-158-6606

## SECTION 2: Hazards identification

## Classification of the substance or mixture

Acute toxicity - Category 2, Oral  
Acute toxicity - Category 1, Dermal  
Skin corrosion, Sub-category 1A  
Acute toxicity - Category 2, Inhalation

## Label elements

## Pictogram(s)

☐

Signal word : Danger

## Hazard statement(s)

H300 Fatal if swallowed  
H310 Fatal in contact with skin  
H314 Causes severe skin burns and eye damage  
H318 Causes serious eye damage  
H330 Fatal if inhaled

**Precautionary statement(s)**

P260 Do not breathe dust/fume/gas/mist/vapours/spray.

P280 Wear protective gloves/protective clothing/eye protection/face protection.

P320 Specific treatment is urgent (see ... on this label).

P303+P361+P353 IF ON SKIN (or hair): Remove/Take off Immediately all contaminated clothing. Rinse SKIN with water/shower.

P304+P340 IF INHALED: Remove victim to fresh air and Keep at rest in a position comfortable for breathing.

P305+P351+P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do.

Continuerinsing.

P405 Store locked up.

P403+P233 Store in a well-ventilated place. Keep container tightly closed.

**Prevention**

P264 Wash ... thoroughly after handling.

P270 Do not eat, drink or smoke when using this product.

P262 Do not get in eyes, on skin, or on clothing.

P280 Wear protective gloves/protective clothing/eye protection/face protection/hearing protection/...

P260 Do not breathe dust/fume/gas/mist/vapours/spray.

P271 Use only outdoors or in a well-ventilated area.

P284 [In case of inadequate ventilation] wear respiratory protection.

**Response**

P301+P316 IF SWALLOWED: Get emergency medical help immediately.

P321 Specific treatment (see ... on this label).

P330 Rinse mouth.

P302+P352 IF ON SKIN: Wash with plenty of water/...

P316 Get emergency medical help immediately.

P361+P364 Take off immediately all contaminated clothing and wash it before reuse.

P301+P330+P331 IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.

P363 Wash contaminated clothing before reuse.

P304+P340 IF INHALED: Remove person to fresh air and keep comfortable for breathing.

P305+P351+P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

P320 Specific treatment is urgent (see ... on this label).

**Storage**

P405 Store locked up.

P403+P233 Store in a well-ventilated place. Keep container tightly closed.

**Disposal**

P501 Dispose of contents/container to an appropriate treatment and disposal facility in accordance with applicable laws and regulations, and product characteristics at time of disposal.

**Other hazards**

no data available

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## SECTION 3: Composition/information on ingredients

## Substance

|              |                         |
|--------------|-------------------------|
| Product name | : Hydrogen fluoride     |
| Synonyms     | : HF, Hydrofluoric Acid |
| CAS          | : 7664-39-3             |
| EC number    | : 231-634-8             |
| MF           | : FH                    |
| MW           | : 20.01                 |

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## SECTION 4: First aid measures

### Description of first aid measures

#### If inhaled

Fresh air, rest. Half-upright position. Artificial respiration may be needed. Refer immediately for medical attention.

#### Following skin contact

Wear protective gloves when administering first aid. Remove contaminated clothes. Rinse skin with plenty of water or shower. Refer immediately for medical attention.

#### Following eye contact

Rinse with plenty of water (remove contact lenses if easily possible). Refer immediately for medical attention.

#### Following ingestion

Rinse mouth. Give nothing to drink. Do NOT induce vomiting. Refer immediately for medical attention.

### Most important symptoms and effects, both acute and delayed

Ingestion of an estimated 1.5 grams produced sudden death without gross pathological damage. Repeated ingestion of small amounts resulted in moderately advanced hardening of the bones. Contact of skin with anhydrous liquid produces severe burns. Inhalation of anhydrous hydrogen fluoride or hydrogen fluoride mist or vapors can cause severe respiratory tract irritation that may be fatal. (EPA, 1998)

### Indication of any immediate medical attention and special treatment needed

Basic treatment: Establish a patent airway (oropharyngeal or nasopharyngeal airway, if needed). Suction if necessary. Watch for signs of respiratory insufficiency and assist ventilations if necessary. Administer oxygen by nonrebreather mask at 10 to 15 L/min. Monitor for pulmonary edema and treat if necessary. Monitor for shock and treat if necessary. For eye contamination, flush eyes immediately with water. Irrigate each eye continuously with 0.9% saline (NS) during transport. Do not use emetics. For ingestion, rinse mouth and administer 5 ml/kg up to 200 ml of water if the patient can swallow, has a strong gag reflex, and does not drool. Do not attempt to neutralize because of exothermic reaction. Cover skin burns with dry, sterile dressings after decontamination. Hydrofluoric Acid (HF) and Related Compounds

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## SECTION 5: Firefighting measures

### Extinguishing media

If material involved in fire: Extinguish fire using agent suitable for type of surrounding fire. (Material itself does not burn or burns with difficulty.) Use water in flooding quantities as fog. Cool all affected containers with flooding quantities of water. Apply water from as far a distance as possible. Hydrofluoric acid solution

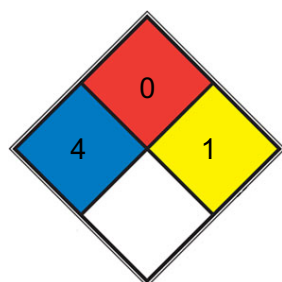
### Specific Hazards Arising from the Chemical

When heated, it emits highly corrosive fumes of fluorides. Its corrosive action on metals can result in formation of hydrogen in containers and piping to create fire hazard. Toxic and irritating vapors are generated when heated. Will attack glass, concrete, and certain metals, especially those containing silica, such as cast iron. Will attack natural rubber, leather, and many organic materials. May generate flammable hydrogen gas in contact with some metals. (EPA, 1998)

### Advice for firefighters

In case of fire in the surroundings, use appropriate extinguishing media. In case of fire: keep drums, etc., cool by spraying with water. Combat fire from a sheltered position.

### NFPA 704



**HEALTH 4** Very short exposure could cause death or major residual injury (e.g. hydrogen cyanide, phosgene, methyl isocyanate, [hydrofluoric acid](#))

**FIRE 0** Materials that will not burn under typical fire conditions, including intrinsically noncombustible materials such as concrete, stone, and sand. Materials that will not burn in air when exposed to a temperature of 820 °C (1,500 °F) for a period of 5 minutes.(e.g. Carbon tetrachloride)

**REACT 1** Normally stable, but can become unstable at elevated temperatures and pressures (e.g. [propene](#))

**SPEC.**  
**HAZ.**

## SECTION 6: Accidental release measures

### Personal precautions, protective equipment and emergency procedures

Evacuate danger area! Consult an expert! Personal protection: chemical protection suit including self-contained breathing apparatus. Do NOT let this chemical enter the environment. Ventilation. Cover the spilled material with dry sand or dry earth. Collect the spilled substance into containers. Then store and dispose of according to local regulations.

### Environmental precautions

Evacuate danger area! Consult an expert! Personal protection: gas-tight chemical protection suit including self-contained breathing apparatus. Do NOT let this chemical enter the environment. Ventilation. Remove vapour with fine water spray.

### Methods and materials for containment and cleaning up

1. ventilate area of spill or leak to disperse gas. 2. if in gaseous form, stop flow of gas. if source of leak is cylinder & leak cannot be stopped ... remove ... to safe place in open air, & repair leak or allow cylinder to empty. 3. if in liq form, allow to vaporize & disperse the gas.

## SECTION 7: Handling and storage

## Precautions for safe handling

NO contact with incompatible substances. See Chemical Dangers. Handling in a well ventilated place. Wear suitable protective clothing. Avoid contact with skin and eyes. Avoid formation of dust and aerosols. Use non-sparking tools. Prevent fire caused by electrostatic discharge steam.

## Conditions for safe storage, including any incompatibilities

Cool. Fireproof if in building. Keep in a well-ventilated room. Separated from food and feedstuffs and incompatible materials. Store in an area without drain or sewer access. See Chemical Dangers. Hydrogen fluoride must be stored to avoid contact with metals, concrete, glass, and ceramics, because it can severely corrode these materials. Contact with metals may form a flammable gas. Keep away from heat. Where possible automatically pump liquid from drums or other storage containers to process containers.

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## SECTION 8: Exposure controls/personal protection

### Control parameters

#### Occupational Exposure limit values

TLV: (as F): 0.5 ppm as TWA; 2 ppm as STEL; (skin); BEI issued. MAK: (as F): 0.83 mg/m<sup>3</sup>, 1 ppm; peak limitation category: I(2); pregnancy risk group: C. EU-OEL: 1.5 mg/m<sup>3</sup> as TWA; 2.5 mg/m<sup>3</sup> as STEL

#### Biological limit values

no data available

### Exposure controls

Ensure adequate ventilation. Handle in accordance with good industrial hygiene and safety practice. Set up emergency exits and the risk-elimination area.

### Individual protection measures

#### Eye/face protection

Wear face shield or eye protection in combination with breathing protection.

#### Skin protection

Protective gloves. Protective clothing. Apron.

#### Respiratory protection

Use ventilation, local exhaust or breathing protection.

#### Thermal hazards

no data available

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## SECTION 9: Physical and chemical properties

### Information on basic physicochemical properties

|                              |  |
|------------------------------|--|
| Physical state               | Liquid, Double Sub-Boiling Quartz Distillation |
| Colour                       | max. 10  |
| Odour                        | ... Strong, irritating odor ...                |
| Melting point/freezing point | -35°C  |

|  |  |
|--|--|
| Boiling point or initial boiling point and boiling range | 105°C  |
| Flammability   | Not combustible. Many reactions may cause fire or explosion.   |
| Lower and upper explosion limit/flammability limit       | no data available  |
| Flash point  | -37.8°C  |
| Auto-ignition temperature                                | Not flammable (USCG, 1999)                                     |
| Decomposition temperature                                | no data available  |
| pH   | 3.27(1 mM solution);2.65(10 mM solution);2.12(100 mM solution) |
| Kinematic viscosity                                      | no data available  |
| Solubility   | Miscible (NIOSH, 2016)   |
| Partition coefficient n-octanol/water                    | 0.23 (estimated)   |
| Vapour pressure  | 25 mm Hg ( 20 °C)  |
| Density and/or relative density                          | 1.15   |
| Relative vapour density                                  | 1.15   |
| Particle characteristics                                 | no data available  |

## SECTION 10: Stability and reactivity

### Reactivity

The substance is a strong acid. It reacts violently with bases and is corrosive. Reacts violently with many compounds. This generates fire and explosion hazard. It reacts violently with bases and is corrosive to most common metals forming a flammable/explosive gas (hydrogen - see ICSC 0001). Attacks glass, some forms of plastic, rubber and coatings.

Over time hydrogen fluoride/hydrofluoric acid corrodes metals, releasing flammable hydrogen. Hydrogen fluoride/hydrofluoric acid reacts with water or steam creating toxic and corrosive fumes. Hydrogen fluoride/hydrofluoric acid attacks glass, ceramics, concrete, some forms of plastic, rubber, and coatings. Hydrogen fluoride/hydrofluoric acid is very reactive with most bases, acids, and oxidants and should not be stored with them.

### Chemical stability

no data available

### Possibility of hazardous reactions

NON-FLAMMABLE ...Hydrogen fluoride/hydrofluoric acid vapors may collect and stay in poorly-ventilated, low-lying, or confined areas (e.g., sewers, basements, and tanks). Hazardous concentrations may develop quickly in enclosed, poorly-ventilated, or low-lying areas. Keep out of these areas. Stay upwind. HYDROGEN FLUORIDE, ANHYDROUS attacks glass and any other silica containing material. May react with common metals (iron, steel) to generate flammable hydrogen gas if diluted below 65% with water. Reacts exothermically with chemical bases (examples: amines, amides, inorganic hydroxides). Can initiate polymerization in certain alkenes. Reacts with cyanide salts and compounds to release gaseous hydrogen cyanide. May generate flammable and/or toxic gases with dithiocarbamates, isocyanates, mercaptans, nitrides, nitriles, sulfides. Additional gas-generating reactions may occur with sulfites, nitrites, thiosulfates (to give H<sub>2</sub>S and SO<sub>3</sub>), dithionites (SO<sub>2</sub>), and carbonates. Can catalyze (increase the rate of) chemical reactions. Reacts explosively with cyanogen fluoride, methanesulfonic acid or glycerol mixed with nitric acid. Reacts violently with arsenic trioxide, phosphorus pentachloride, acetic anhydride, alkali metals, ammonium hydroxide, chlorosulfonic acid, ethylenediamine, fluorine, potassium permanganate, oleum, propylene oxide, vinyl acetate, mercury(II) oxide.

Emits highly corrosive fumes of hydrogen fluoride gas when heated [Sax, 9th ed., 1996, p. 1839]. Contact with many silicon compounds and metal silicides causes violent evolution of gaseous silicon tetrafluoride [Mellor, 1956, Vol. 2, suppl. 1, p. 121].

### **Conditions to avoid**

no data available

### **Incompatible materials**

A super strong acid, aqueous solutions are less strong. Violent reaction with bases. Reacts, possibly with violence, with many compounds including acetic anhydride, aliphatic amines, alcohol, alkanolamines, alkylene oxides, aromatic amines, amides, 2-aminoethanol, ammonia, ammonium hydroxide, arsenic trioxide, bismuthic acid, calcium oxide, ethylene diamine, ethyleneimine, epichlorohydrin, isocyanates, metal acetylides, nitrogen trifluoride, oleum, organic anhydrides, oxygen difluoride, phosphorus pentoxide, sulfuric acid, strong oxidizers, vinyl acetate, vinylidene fluoride. Attacks some plastics, rubber, and coatings.

### **Hazardous decomposition products**

When heated to decomp it emits highly corrosive fumes of ... /hydrogen fluoride/.

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## **SECTION 11: Toxicological information**

### **Acute toxicity**

- Oral: no data available
- Inhalation: LC50 Rat inhalation 1278 ppm/1 hr
- Dermal: no data available

### **Skin corrosion/irritation**

no data available

### **Serious eye damage/irritation**

no data available

### **Respiratory or skin sensitization**

no data available

### **Germ cell mutagenicity**

no data available

### **Carcinogenicity**

no data available

### **Reproductive toxicity**

Fluoride has been observed to cross the placenta in humans. Dental fluorosis can occur in a child's teeth when the mother receives high levels of fluoride during pregnancy. In some animal studies, oral exposure to fluoride has caused impaired reproduction and malformation of fetal bones and teeth. Inhalation of hydrogen fluoride resulted in degenerative testicular changes in male dogs. Menstrual irregularities have been observed in women occupationally exposed to fluoride; no differences were found in the numbers of pregnancies, miscarriages, or births.

### **STOT-single exposure**

The substance is very corrosive to the eyes, skin and respiratory tract. Inhalation of the vapour may cause lung oedema. Inhalation may cause asthma-like reactions (RADS). Exposure could cause asphyxiation due to swelling in the throat. Inhalation may cause pneumonitis. See Notes. Exposure could cause hypocalcemia. The effects may be delayed. Exposure above the OEL could cause death.

### **STOT-repeated exposure**

Fluoride can accumulate in teeth, joints and bones. This may result in stained tooth enamel up to joint and bone disorders (fluorosis).

### **Aspiration hazard**

A harmful contamination of the air can be reached very quickly on evaporation of this substance at 20°C.

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## SECTION 12: Ecological information

### **Toxicity**

Toxicity to fish: no data available

Toxicity to daphnia and other aquatic invertebrates: no data available

Toxicity to algae: no data available

Toxicity to microorganisms: no data available

### **Persistence and degradability**

no data available

### **Bioaccumulative potential**

no data available

### **Mobility in soil**

no data available

### **Other adverse effects**

no data available

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## SECTION 13: Disposal considerations

### **Disposal methods**

#### **Product**

The material can be disposed of by removal to a licensed chemical destruction plant or by controlled incineration with flue gas scrubbing. Do not contaminate water, foodstuffs, feed or seed by storage or disposal. Do not discharge to sewer systems.

#### **Contaminated packaging**

Containers can be triply rinsed (or equivalent) and offered for recycling or reconditioning. Alternatively, the packaging can be punctured to make it unusable for other purposes and then be disposed of in a sanitary landfill. Controlled incineration with flue gas scrubbing is possible for combustible packaging materials.

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## SECTION 14: Transport information

### UN Number

ADR/RID: UN1790 (For reference only, please check.)

IMDG: UN1790 (For reference only, please check.)

IATA: UN1790 (For reference only, please check.)

### UN Proper Shipping Name

ADR/RID: HYDROFLUORIC ACID, with more than 60% hydrogen fluoride (For reference only, please check.)

IMDG: HYDROFLUORIC ACID, with more than 60% hydrogen fluoride (For reference only, please check.)

IATA: HYDROFLUORIC ACID, with more than 60% hydrogen fluoride (For reference only, please check.)

### Transport hazard class(es)

ADR/RID: 8 (For reference only, please check.)

IMDG: 8 (For reference only, please check.)

IATA: 8 (For reference only, please check.)

### Packing group, if applicable

ADR/RID: I (For reference only, please check.)

IMDG: I (For reference only, please check.)

IATA: I (For reference only, please check.)

### Environmental hazards

ADR/RID: No

IMDG: No

IATA: No

### Special precautions for user

no data available

### Transport in bulk according to IMO instruments

no data available

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## SECTION 15: Regulatory information

### Safety, health and environmental regulations specific for the product in question

#### European Inventory of Existing Commercial Chemical Substances (EINECS)

Listed.

#### EC Inventory

Listed.

#### United States Toxic Substances Control Act (TSCA) Inventory

Listed.

#### China Catalog of Hazardous chemicals 2015

Listed.

#### **New Zealand Inventory of Chemicals (NZIoC)**

Listed.

#### **PICCS**

Listed.

#### **Vietnam National Chemical Inventory**

Listed.

#### **IECSC**

Listed.

#### **Korea Existing Chemicals List (KECL)**

Listed.

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## SECTION 16: Other information

### **Abbreviations and acronyms**

CAS: Chemical Abstracts Service

ADR: European Agreement concerning the International Carriage of Dangerous Goods by Road

RID: Regulation concerning the International Carriage of Dangerous Goods by Rail

IMDG: International Maritime Dangerous Goods

IATA: International Air Transportation Association

TWA: Time Weighted Average

STEL: Short term exposure limit

LC50: Lethal Concentration 50%

LD50: Lethal Dose 50%

EC50: Effective Concentration 50%

### **References**

IPCS - The International Chemical Safety Cards (ICSC), website: <http://www.ilo.org/dyn/icsc/showcard.home>

HSDB - Hazardous Substances Data Bank, website: <https://toxnet.nlm.nih.gov/newtoxnet/hsdb.htm>

IARC - International Agency for Research on Cancer, website: <http://www.iarc.fr/>

eChemPortal - The Global Portal to Information on Chemical Substances by OECD, website: [http://www.echemportal.org/echemportal/index?pageID=0&request\\_locale=en](http://www.echemportal.org/echemportal/index?pageID=0&request_locale=en)

CAMEO Chemicals, website: <http://cameochemicals.noaa.gov/search/simple>

ChemIDplus, website: <http://chem.sis.nlm.nih.gov/chemidplus/chemidlite.jsp>

ERG - Emergency Response Guidebook by U.S. Department of Transportation, website: <http://www.phmsa.dot.gov/hazmat/library/erg>

Germany GESTIS-database on hazard substance, website: <http://www.dguv.de/ifa/gestis/gestis-stoffdatenbank/index-2.jsp>

ECHA - European Chemicals Agency, website: <https://echa.europa.eu/>

### **Other Information**

The occupational exposure limit value should not be exceeded during any part of the working exposure. The symptoms of lung oedema often do not become manifest until a few hours have passed and they are aggravated by physical effort. Rest and medical observation are therefore essential. Specific treatment is necessary in case of poisoning with this substance; the appropriate means with instructions must be available. Isolate contaminated clothing by sealing in a bag or other container. UN number for hydrogen fluoride as a gas is 1052, hazard class

8, subsidiary hazard 6.1, packing group 1. The partial vapour pressure is 20 kPa at 25 °C.

**Disclaimer:**

The information in this MSDS is only applicable to the specified product, unless otherwise specified, it is not applicable to the mixture of this product and other substances. This MSDS only provides information on the safety of the product for those who have received the appropriate professional training for the user of the product. Users of this MSDS must make independent judgments on the applicability of this SDS. The authors of this MSDS will not be held responsible for any harm caused by the use of this MSDS.