

SAFETY DATA SHEET

Hydrogen fluoride 99.99%

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Version: 3.0

1. IDENTIFICATION

A. Product name

- Hydrogen fluoride 99.99%

B. Recommended use and restriction on use

- General use : Not available
- Restriction on use : Not available

C. Manufacturer / Supplier / Distributor information

o Manufacturer information

- Company name : RIGAS Co.,Ltd
- Address : 46,Munpyeongseo-ro 17 beon-gil, Daedeok-gu,Daejeon, KOREA
- Dept. : Management Planning Dept.
- Telephone number : 82-42-934-6900
- Emergency telephone number : 82-42-934-6900
- Fax number : 82-42-935-8814
- E-mail address : master@rigas.co.kr

o Supplier/Distributor information

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2. HAZARD IDENTIFICATION

A. GHS Classification

- Gases under pressure : Liquefied gas
- Acute toxicity (inhalation: gas) : Category2
- Skin corrosion/irritation : Category1B
- Serious eye damage/irritation : Category1
- Skin sensitization : Category1
- Germ cell mutagenicity : Category2
- Specific target organ toxicity(Single exposure) : Category1
- Specific target organ toxicity(Repeated exposure) : Category1

B. GHS label elements

o Hazard symbols



o Signal words

- Danger

○ **Hazard statements**

- H280 Compressed gas ; Contains gas under pressure; may explode if heated
- H314 Causes severe skin burns and eye damage
- H317 May cause an allergic skin reaction
- H318 Causes serious eye damage
- H330 Fatal if inhaled
- H341 Suspected of causing genetic defects
- H370 Causes damage to organs(Refer Section SDS 11)
- H372 Causes damage to organs through prolonged or repeated exposure (Refer Section SDS 11)

○ **Precautionary statements**

1) Prevention

- P201 Obtain special instructions before use.
- P202 Do not handle until all safety precautions have been read and understood.
- P260 Do not breathe gas/mist/vapours/spray.
- P261 Avoid breathing gas/mist/vapours/spray.
- P264 Wash hands thoroughly after handling.
- P270 Do not eat, drink or smoke when using this product.
- P271 Use only outdoors or in a well-ventilated area.
- P272 Contaminated work clothing should not be allowed out of the workplace.
- P280 Wear protective gloves/protective clothing/eye protection/face protection.
- P284 Wear respiratory protection.

2) Response

- P301+P330+P331 IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.
- P302+P352 IF ON SKIN: Wash with plenty of soap and water.
- 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. Continue rinsing.
- P307+P311 If exposed: Call a POISON CENTER or doctor/physician.
- P308+P313 If exposed or concerned: Get medical advice/attention.
- P310 Immediately call a POISON CENTER or doctor/physician.
- P314 Get medical advice/attention if you feel unwell.
- P320 Specific treatment is urgent
- P321 Specific treatment
- P333+P313 If skin irritation or rash occurs: Get medical advice/attention.
- P363 Wash contaminated clothing before reuse.

3) Storage

- P403+P233 Store in a well-ventilated place. Keep container tightly closed.
- P405 Store locked up.
- P410+P403 Protect from sunlight. Store in a well-ventilated place.

4) Disposal

- P501 Dispose of contents/container in accordance with local/regional/national/international regulation

C. Other hazards which do not result in classification

- Not available

3. COMPOSITION/INFORMATION ON INGREDIENTS

Chemical Name	Trade names and Synonyms	CAS No.	Content(%)
Hydrogen fluoride	Fluorohydric acid ; Aqueous hydrogen fluoride ;	7664-39-3	99.99

4. FIRST AID MEASURES

A. Eye contact

- Do not rub your eyes.
- Immediately flush eyes with plenty of water for at least 15 minutes and call a doctor/physician.
- Get medical attention immediately.

- Remove contact lenses if worn.

B. Skin contact

- Flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes.
- Wash contaminated clothing thoroughly before re-using.
- Accidental contact with liquefied gas or refrigerated liquefied gas may cause burn, severe mayhem and perfrigeration, so please take emergency medical action.
- Get medical attention immediately.
- Go to the hospital immediately if symptoms(flare, irritate) occur.
- In case of accidental contact with liquefied gas or refrigerated liquefied gas, warm up the contact part with lukewarm water.
- Wash thoroughly after handling.

C. Inhalation contact

- When exposed to large amounts of steam and mist, move to fresh air.
- Take specific treatment if needed.
- Get medical attention immediately.
- Go to the hospital immediately if symptoms(flare, irritate) occur.
- If breathing is stopped or irregular, give artificial respiration and supply oxygen.

D. Ingestion contact

- Please be advised by doctor whether induction of vomit is demanded or not.
- Rinse your mouth with water immediately.
- Get medical attention immediately.

E. Delayed and immediate effects and also chronic effects from short and long term exposure

- Not available

F. Notes to physician

- Notify medical personnel of contaminated situations and have them take appropriate protective measures.
- If exposed or concerned, get medical attention/advice.

5. FIREFIGHTING MEASURES

A. Suitable (Unsuitable) extinguishing media

- Dry chemical, carbon dioxide, regular foam extinguishing agent, spray
- Avoid use of water jet for extinguishing

B. Specific hazards arising from the chemical

- high-pressure gas; May explode when heated.

C. Special protective actions for firefighters

- Notify your local firestation and inform the location of the fire and characteristics hazard.
- In case of conflagration, use automatic fire sprinkler. Major fire may require withdrawal, allowing the object itself to burn.
- Do not approach the tank surrounded by fire until it is extinguished.
- Use appropriate extinguishing measure suitable for surrounding fire.
- Wear appropriate protective equipment.
- Keep containers cool with water spray.

6. ACCIDENTAL RELEASE MEASURES

A. Personal precautions, protective equipment and emergency procedures

- Wear proper personal protective apparatus as indicated in Section 8 and avoid skin contact and inhalation.
- Ventilate closed spaces before entering.
- Do not touch spilled material. Stop leak if you can do it without risk.
- Move container to safe area from the leak area.
- Avoid skin contact and inhalation.
- Cleanup and disposal under expert supervision is advised.
- Keep unauthorized people away, isolate hazard area and deny entry.

B. Environmental precautions

- Prevent runoff and contact with waterways, drains or sewers.
- If large amounts have been spilled, inform the relevant authorities.

C. Methods and materials for containment and cleaning up

- Large spill : Stay upwind and keep out of low areas. Dike for later disposal.
- Notify the central and local government if the emission reach the standard threshold.
- Disposal of waste shall be in compliance with the Wastes Control?Act
- Appropriate container for disposal of spilled material collected.

7. HANDLING AND STORAGE

A. Precautions for safe handling

- Since emptied containers retain product residue(vapor, liquid, solid) follow all MSDS and label warnings even after container is emptied.
- Avoid contact with incompatible materials.
- Get the manual before use.
- Refer to Engineering controls and personal protective equipment.
- Contaminated work clothing should not be allowed out of the workplace.

B. Conditions for safe storage, including any incompatibilities

- Do not apply direct heat.
- Store according to current laws and regulations
- Do not apply any physical shock to container.
- Keep in the original container.
- No open fire.
- Collected them in sealed containers.
- Store in well ventilated area.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

A. Exposure limits

- o **ACGIH TLV**
 - [Hydrogen fluoride] : TWA, 0.5 ppm, as F, Ceiling, 2 ppm, as F Skin
- o **OSHA PEL**
 - [Hydrogen fluoride]:3ppm

B. Engineering controls

- Business owner is recommended to maintain below recommended exposure limits for the working place with general exhaust of gas/vapour/mist/fume.

C. Individual protection measures, such as personal protective equipment

- o **Respiratory protection**
 - Respiratory protection is ranked in order from minimum to maximum.
 - Consider warning properties before use.
 - Any chemical cartridge respirator with organic vapor cartridge(s).
 - Any chemical cartridge respirator with a full facepiece and organic vaporcartridge(s).
 - Any air-purifying respirator with a full facepiece and an organic vapor canister.
 - For Unknown Concentration or Immediately Dangerous to Life or Health : Any supplied-air respirator with full facepiece and operated in a pressure-demand or other positive-pressure mode in combination with a separate escape supply. Any self-contained breathing apparatus with a full facepiece.
 - Under conditions of frequent use or heavy exposure, Respiratory protection may be needed.
- o **Eye protection**
 - Wear primary eye protection such as splash resistant safety goggles with a secondary protection face shield.
 - Provide an emergency eye wash station and quick drench shower in the immediate work area.
- o **Hand protection**
 - Wear appropriate chemical resistant glove.
- o **Skin protection**
 - Wear appropriate chemical resistant protective clothing.
- o **Others**

- Not available

9. PHYSICAL AND CHEMICAL PROPERTIES

A. Appearance	HF
- Appearance	Liquid
- Color	colorless
B. Odor	Pungent odor
C. Odor threshold	0.5 ppm
D. pH	Not available
E. Melting point/Freezing point	-83.53 °C
F. Initial Boiling Point/Boiling Ranges	19.51 °C
G. Flash point	Not available
H. Evaporation rate	Not available
I. Flammability(solid, gas)	incombustible gas
J. Upper/Lower Flammability or explosive limits	Not available
K. Vapour pressure	917 mmHg (25°C)
L. Solubility	(Soluble)
M. Vapour density	1.27 (34°C, Air=1)
N. Specific gravity	1.002
O. Partition coefficient of n-octanol/water	Not available
P. Autoignition temperature	Not available
Q. Decomposition temperature	Not available
R. Viscosity	0.256 cP (0°C, liquid)
S. Molecular weight	20.01

10. STABILITY AND REACTIVITY

A. Chemical Stability

- high-pressure gas; May explode when heated.

B. Possibility of hazardous reactions

- Contact with other combustible material may cause fire.

C. Conditions to avoid

- Avoid contact with incompatible materials and condition.
- Avoid : Accumulation of electrostatic charges, Heating, Flames and hot surfaces
- Avoid contact with heat, sparks, flame or other ignition sources.

D. Incompatible materials

- Not available

E. Hazardous decomposition products

- May emit flammable vapour if involved in fire.

11. TOXICOLOGICAL INFORMATION

A. Information on the likely routes of exposure

- (Respiratory tracts)
 - Not available
- (Oral)
 - Not available
- (Eye/Skin)
 - Causes serious eye damage
 - Causes severe skin burns and eye damage
 - May cause an allergic skin reaction

B. Delayed and immediate effects and also chronic effects from short and long term exposure

- **Acute toxicity**
 - * **Oral**
 - Not available
 - * **Dermal**
 - [Hydrogen fluoride] : EU CLP 1
 - * **Inhalation**
 - [Hydrogen fluoride] : LC50 Rat 672 ppm/4 hr (2689 ppm/15min)(HSDB)
- **Skin corrosion/irritation**
 - Causes severe skin burns and eye damage
- **Serious eye damage/irritation**
 - Causes serious eye damage
- **Respiratory sensitization**
 - Not available
- **Skin sensitization**
 - May cause an allergic skin reaction
- **Carcinogenicity**
 - * **IARC**
 - Not available
 - * **OSHA**
 - Not available
 - * **ACGIH**
 - Not available
 - * **NTP**
 - Not available
 - * **EU CLP**
 - Not available
- **Germ cell mutagenicity**
 - Suspected of causing genetic defects
- **Reproductive toxicity**
 - Not available
- **STOT-single exposure**
 - Causes damage to organs
- **STOT-repeated exposure**
 - Causes damage to organs through prolonged or repeated exposure
- **Aspiration hazard**
 - Not available

12. ECOLOGICAL INFORMATION

A. Ecotoxicity

- **Fish**
 - [Hydrogen fluoride] : LC50 51 mg/ℓ ~ 340 mg/ℓ 96 hr
- **Crustaceans**
 - [Hydrogen fluoride] : EC50 97 mg/ℓ 48 hr Daphnia magna
- **Algae**
 - [Hydrogen fluoride] : EC50 122 mg/ℓ ~ 43 mg/ℓ 72 hr (various algae species)

B. Persistence and degradability

- **Persistence**
 - Not available
- **Degradability**
 - Not available

C. Bioaccumulative potential

- **Bioaccumulative potential**
 - [Hydrogen fluoride] : BCF 53 ~ 58
- **Biodegradation**
 - Not available

D. Mobility in soil

- Not available

E. Other adverse effects

- Not available

13. DISPOSAL CONSIDERATIONS**A. Disposal methods**

- Stabilization and minimization treatment by incineration or similar method can be applied, if more than two kinds of designated wastes are in mixture state and it is impractical to separate them
- Oil water separation technology shall be applied as pre-waste treatment if it is applicable
- It shall be treated by incineration

B. Special precautions for disposal

- Anyone with business license number who generates industrial wastes shall treat the waste by him/herself or by entrusting to the legal entities who treat the wastes, recycle the wastes of others or install and operate the waste treatment facilities according to the Wastes Control Act
- Dispose of waste in accordance with all applicable laws and regulations.

14. TRANSPORT INFORMATION**A. UN No. (IMDG)**

- 1052

B. Proper shipping name

- HYDROGEN FLUORIDE, ANHYDROUS

C. Hazard Class

- 8

D. IMDG CODE/IATA DGR Packing group

- I

E. Marine pollutant

- Not applicable

F. Special precautions for user related to transport or transportation measures

- Local transport follows in accordance with Dangerous goods Safety Management Law.
- Package and transport follow in accordance with Department of Transportation (DOT) and other regulatory agency requirements.
- EmS FIRE SCHEDULE : F-C (Non-flammable gases)
- EmS SPILLAGE SCHEDULE : S-U (Gases (flammable, toxic or corrosive))

15. REGULATORY INFORMATION**A. National and/or international regulatory information**

- o **POPs Management Law**
 - [Hydrogen fluoride] : Not applicable
- o **Information of EU Classification**
 - * **Classification**
 - [Hydrogen fluoride] : H330, H310, H300, H314
- o **U.S. Federal regulations**
 - * **OSHA PROCESS SAFETY (29CFR1910.119)**
 - [Hydrogen fluoride] : 453.599 kg 1000 lb
 - * **CERCLA Section 103 (40CFR302.4)**
 - [Hydrogen fluoride] : 45.3599 kg 100 lb
 - * **EPCRA Section 302 (40CFR355.30)**
 - [Hydrogen fluoride] : 45.3599 kg 100 lb
 - * **EPCRA Section 304 (40CFR355.40)**

- [Hydrogen fluoride] : 45.3599 kg 100 lb
- * **EPCRA Section 313 (40CFR372.65)**
- [Hydrogen fluoride] : Applicable
- **Rotterdam Convention listed ingredients**
 - Not applicable
- **Stockholm Convention listed ingredients**
 - Not applicable
- **Montreal Protocol listed ingredients**
 - Not applicable

16. OTHER INFORMATION

A. Reference

- The information contained herein is believed to be accurate. It is provided independently of any sale of the product for purpose of hazard communication. It is not intended to constitute performance information concerning the product. No express warranty, or implied warranty of merchantability or fitness for a particular purpose is made with respect to the product or the information contained herein.
- This Safety Data Sheet was compiled with data and information from the following sources: KOSHA, NITE, ESIS, NLM, SIDS, IPCS

B. Issue date

- 2020-05-08

C. Revision number and Last date revised

- 3 times, 2020-01-16

D. Other

- This SDS is prepared according to the Globally Harmonized System (GHS).