



Material Safety Data Sheet


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Section 1 - Product and Company Identification

Product name : Hydrogen Fluoride, 49%	
Other names : --	
Product use : Alkylation; chemical derivatives, Alkylation catalyst, Dehydration, polymerization. Inorganic and organic reaction fluoride agents; Fluoride and Aluminum fluoride produce. Additive of the Liquid rocket propellant; Uranium fine production.	
Supplier's name : San Fu Chemical Co., Ltd., Shan Hua Plant	
Supplier's address : 340 Hsiao Hsin Li, Shan Hua Town, Tainan Hsien, Taiwan, R.O.C.	
Supplier's phone : 06-5837608	Emergency phone : 06-5837608
FAX. : 06-5839498	

Section 2 - Hazards Identification

Classification :	
1. Acute toxicity	Category 3 (Inhalation)
2. Corrosive to Metal	Category 1
3. Skin Corrosion/ irritation	Category 1
4. Serious eye damage/ irritation	Category 1
5. Specific target organ systemic toxicity	Repeated exposure Category 1
The Most Important Hazards and effect	
Label element :	
■ Hazard symbol : Corrosive, Skull and Crossbones, Healthy Hazards	
	
■ Signal word : Danger	
Hazard statement :	
1. Poisoning while inhale	
2. May corrosive to metal	
3. Cause serious skin burn and eye damage	
4. Cause serious eye damage	
5. Repeat or long term exposure may cause organ damage	
Precautionary statement :	
1. If contact with eyes, flush with large amount of water immediately seek medical attention.	
2. In case of accident or if you feel unwell, seek medical attention immediately	
3. Wear suitable protective clothing, gloves, goggles/ face shield.	
4. Keep container tightly closed. Store in the well ventilated place.	
Others Hazard : --	

Section 3 - Composition/Information On Ingredients

Pure Substance :

Chemical name : Hydrogen Fluoride
Synonyms : Hydrofluoride, Fluorohydric Acid, Anhydrous Hydrofluoric Acid, HF, Anhydrous hydrogen fluoride



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CAS No. : 7664-39-3

Ingredient contributing to the hazard(%) : 49%

Section 4 - First Aid Measures

The First-aid Information :

■ Inhalation :

1. Before rescue, required proper and safety protective equipments to ensure the self safety.
2. Remove the contaminated origin or move the patient to an air-circulated place.
3. If the person is not breathing, give Artificial Respiration or CPR immediately by the trained personnel.
4. Don't use the mouth to mouth Artificial Respiration; suggest using pocket mask with one way valve design or other supportive tools.
5. Seek medical attention immediately after contact.

■ Skin Contact :

1. Avoid direct contact with chemicals, required impervious gloves.
2. In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing, shoes, and leather product.
3. Immerse in the cold 0.2% Hyamine 1622 water solution (1 : 500) or cold 0.13% Zephiran.
4. Put the 2.5% Calcium Gluconate gel on the burned sensitive tissue.
5. Seek medical attention immediately.

■ Eye Contact :

1. Required chemical protective goggles.
2. In case of contact, immediately flush eyes with plenty of water for at least 15~30 minutes. Keep eyelid apart and away from eyeballs during irrigation.
3. If a physician is not immediately available, apply one or two drops of 0.5% tetracaine hydrochloride solution or other aqueous, topical ophthalmic anesthetic and continue irrigation.
4. Seek medical attention immediately

■ Ingestion :

1. If the patient lost of consciousness or cramp, don't give any food.
2. Rinse the mouth with water.
3. Don't induce vomit.
4. Give 240~300ml 10% Calcium Gluconate solution for the patient to dilute the substance in the stomach.
5. If the patient vomits spontaneity, lean forward the patient to prevent inhalation of the vomit.
6. Give water repeatedly and Seek medical attention immediately.

The Most Important Symptoms and Hazardous Effects : Irritated Pain

Protection of First-aiders : Avoid contact with eye, skin, and clothes. Required proper protective clothing and safety impervious gloves.

Notes to a Physician : Monitor and correct for hypocalcaemia, cardiac arrhythmia, hypomagnesemia and hyperkalemia. Calcium Gluconate in normal saline by nebulizer or by IPPB with 100% oxygen may decrease pulmonary damage.



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Section 5 - Fire Fighting Measures

<p>Extinguishing Media :</p> <ul style="list-style-type: none">• Small fire: Use CO₂, chemical powder, dry sand.• Large fire: Use water spray and water bubbles to control the fire.• Do not use solid water stream.
<p>Specific Hazards when Fire-fight :</p> <ol style="list-style-type: none">1. Do not direct contact or near ruptured tank or spills of HF. Acid react with water and can splatter acid onto personnel.2. While HF stored in the metal containers, the combustible hydrogen may be produced and accumulated.
<p>Specific Fire-fighting Procedure : --</p>
<p>Specific Protection of Firefighters : If the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full face piece operated in the pressure demand or other positive pressure mode.</p>

Section 6 - Accidental Release Measures

<p>Personal Precautions :</p> <ol style="list-style-type: none">1. Restrict access the area until completion of clean up.2. Ensure clean up is conducted by trained personnel only.3. Provide proper personal protective equipments.4. Wear gas contained acid fast clothing for best protection.5. Eliminate or block out all the ignition sources.6. Refer to the government safety and environmental protection unit.7. Do not touch the spills.
<p>Environmental Precautions :</p> <ol style="list-style-type: none">1. Avoid empty to the limited space such as drain and sewer.2. If safe to do so, try to prevent or reduce leakage.3. Use the soil, dry sand or other non-combustible material to absorb the leakage.4. Water spray to decrease the amount of vapor or moving vapor cloud.5. Do not pour water directly to the contaminated material or leakage. Do not let the water flow in the container.6. If possible, reverse the spilled container to release the gas instead of liquid.7. Wear full protective equipments including respirator. Stay in the upwind area. First, wash with water carefully then drain with hose to the area where could neutralize the substance with lime and soda ash.
<p>Methods for Cleaning up :</p> <ol style="list-style-type: none">1. Avoid contact with spilled material. If safe to do so, stop leakage.2. Water spray to decrease the vapor or moving vapor.3. Do not let the water flow in the container.4. Avoid empty to the limited space such as drain and sewer.

Section 7 - Handling and Storage

<p>Handling :</p> <ol style="list-style-type: none">1. HF will react with some material of the container or contaminated products to generate the explosive hydrogen gas.2. While opening the HF container, ensure the working area is well ventilated and no exist of the



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spark or source of ignition. 3. Very careful with the operation of the product manufacturing process with HF. 4. Avoid releasing of the vapor in the air of the working area. 5. Operate in the specific well ventilated area and use the minimum amount. 6. Keep a fire extinguisher and cleaning equipment nearby.
Storage : 1. Anhydrous HF should store in the pressure container made by steel. 2. Store away from heat and indirect to sunlight location. 3. Storage area should have proper and independent ventilation and away from ignition and sparks. 4. Fan and Electrical Equipments should be explosive prevented. 5. The building material, lightening and ventilation system in the storage area should be anti-corrosion. 6. Consider installing the spill detection and warning system. 7. Limited storage and restrict the personnel to enter the storage area. 8. Post the warning symbols in the proper place. 9. Storage area and high staff intensive area should be separated. 10. Checking the damage or spill of the container regularly. 11. Must prepare enough shower water in case of emergency. 12. The concentration of the HF below 64% will corrode the metal. In the vacuum environment, could use monel alloy and suitable materials like PE, PP, PVE and PTFE. 70/75%HF is transported by the bulk pressured container with 150PSI. 0/75%HF is transported by PE bottle with the protection of the wood box in UK. Use metal tank with PE lining for exporting.

Section 8 - Exposure Controls & Personal Protection

Engineering measures :			
1. Large amount: Packaging area, Discharging area and open equipments should use mechanical venting system. 2. Small amount: operating in the confined with ventilation place (Ventilation cabinet). The materials must be anti-corrosion.			
Control parameters			
TWA	STEL	Ceiling	Biological standards
3ppm	6ppm		Before working the Creatinine with fluoride ion in the urine is 3mg(B、Ns)
Personal protective equipment :			
<ul style="list-style-type: none"> ■ Respiratory Protection : <ol style="list-style-type: none"> 1. Below 30ppm: Use power air purified or full chemical filtrated respirator apparatus with anti-HF cartridge filter, NIOSH approved full-face piece self-contained breathing apparatus and positive pressure demand with anti-HF cartridge filter. 2. Unknown concentration: NIOSH approved full-face piece oxygen-contained and self-contained breathing apparatus and positive pressure demand. 3. Rescue: NIOSH approved full-face piece with HF cartridge filter, self-contained breathing apparatus. ■ Hand Protection : Wear impervious gloves made of Saranex、Barricade、Chemrel and 			



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Responder the best.

- Eye Protection : Wear chemical protective goggles, face shield, eye washing equipments.
- Skin and Body Protection : Protective clothing, safety shoe, and safety shower equipment.

Hygiene measures :

1. Remove contaminated clothes, clean thoroughly before reuse or disposal. Must advise the danger to the laundry worker.
2. Smoking, eating and drinking are prohibited in work area.
3. Wash hands thoroughly after handling this substance.
4. Maintain a clean work environment.

Section 9 - Physical & Chemical Properties

Appearance : colorless, fuming liquid or gas	Odor : acrid odor Smell: 0.04ppm
Color : Transparent	Melting Point: -83.55°C
pH value : 1.1 (0.1M solution)	Boiling point/boiling range : 19.54 °C
Flammability: --	Flash point : Not flammable
Decomposition temp : --	Test method : -- closed cup
Auto ignition temp : --	Explosion properties : --
Vapor pressure : 4.1 Kpa @21°C	Vapor density : 0.99 @13.6°C (Air =1)
Density : 0.99 @14°C (Water = 1)	Solubility : Infinitely soluble
log Kow : --	Evaporation Rate : --

Section 10 - Stability & Reactivity Data

Stability : Stable at room temperature when stored and used under proper conditions.
Possible hazardous reactions under specific conditions : <ol style="list-style-type: none">1. Alkali (Caustic Soda): violent reaction.2. Fluoride: violent react with 50%HF, may cause of fire.3. Arsenic trioxide: react and generate large amount of heat.4. Glass, Pottery, metal with chert, natural rubber and natural leather: these materials will be dissolved by acid.5. Most of the metal except wax, lead and alloy: these materials will be corroded by acid.
Conditions to avoid : --
Materials to avoid : <ol style="list-style-type: none">1. Alkali (Caustic Soda)2. Fluoride3. Arsenic trioxide4. Glass, Pottery, metal with chert, natural rubber and natural leather5. Most of the metal except wax, lead and alloy
Hazardous decomposition products : --



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Section 11 - Toxicological Information

Route of exposure : Skin, inhalation, ingestion, eyes
Symptoms : Irritation, skin burn, bone weakness and change (osteoporosis)
Immediate Toxicity : <ol style="list-style-type: none">1. Skin :<ol style="list-style-type: none">1.1 The gas or anhydrous liquid may cause deep skin burn pain.1.2 Overdose on the skin will cause death.2. Inhalation :<ol style="list-style-type: none">2.1 Nose, throat, eye and respiratory tract irritation.2.2 High concentration vapor cause severe burn on lip, mouth, throat and lungs.2.3 May cause liquid accumulation in lungs and death.2.4 Expose for a minute with 122ppm concentration cause severe nose, throat and respiratory tract irritation.2.5 Expose for several minutes with 50ppm concentration may cause death.3. Eye : The vapor may dissolve in the water on the eyeball surface and cause irritation.4. Ingestion : Not applicable for HF gas<ul style="list-style-type: none">● LD₅₀: --● LC₅₀: 1108 ppm/1H(rat , inhalation)
Specific effects : <ol style="list-style-type: none">1. Fluoride is needed by bone. But overdose may cause fluoride poisoning (make the bone-weakening and degeneration, which means Bone sclerosis)2. Fluoride poisoning may cause heart, nervous and intestine problems.3. The more you inhale the fluoride, the more fluoride poisoning. After several years, the overdose fluoride will be eliminated and the bone fluoride poisoning will be healed.4. The concentration of fluoride in the urine should lesser than 4mg/l.5. 470ug/m³/4H (pregnant 1-22 days rodent, inhalation) cause increasing the rate of embryonic death.6. IARC rank the HF in Group 3: Can't determine the Carcinogenicity to human being.

Section 12 - Ecological Information

Ecotoxicology : <ul style="list-style-type: none">■ LC₅₀(fish) : 0.282mg/l/96H■ EC₅₀(Aquatic Invertebrates) : --■ Bioconcentration factor (BCF) : --
Persistence and degradability : Fluoride iron may store in the bone, but could be discharged after several years. <ul style="list-style-type: none">■ Half-Life (Air) :■ Half-Life (Water surface) :■ Half-Life (Groundwater) :■ Half-Life (Soil) :
Bioaccumulative potential : --
Mobility in soil : --
Other adverse effects : --



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Section 13 - Disposal Considerations

Methods of disposal :

1. Disposal management from this products and emission standard should follow the environmental laws and regulations.
2. Disposal management should follow the environmental regulation.

Section 14 - MSDS Transport Information

UN classification number : 1790

Proper D.O.T Shipping Name : Hydrogen Fluoride

Hazard Class : Corrosive Category 8

Packing Group : II

Marine pollution : No

Specific precautionary transport measures and conditions : —

Section 15 - Regulatory Information

Regulations :

1. Regulations for Labor Safety and Health Installations
2. Regulations for Chemical Hazard Communication
3. Toxic Chemical Substances Hazard Prevention and Response Plan Regulations
4. Permissible Exposure Limits of Hazardous Substances in the Work Environment
5. Road Traffic Safety Regulations
6. Industrial Waste Storage and Disposal Regulations and Facility Standards

Section 16 - Other Information

Literature references	1. CHEMINFO Database , CCINFO Disc , 2005-3 2. HAZARDTEXT Database , TOMES PLUS Disc , Vol.65 , 2005 3. RTECS Database , TOMES PLUS Disc , Vol.65 , 2005 4. HSDB Database , TOMES PLUS Disc , Vol.65 , 2005 5. Hazardous Chemical Chinese Database, EPA 6. ChemWatch Database , 2005-1		
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Remarks	Symbols Explanations: "--" No information is available at this time. "/" Not applicable to this substance.
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