



Health	3
Fire	0
Reactivity	0
Personal Protection	

# Material Safety Data Sheet

## Hydrofluoric Acid, 40% MSDS

### Section 1: Chemical Product and Company Identification

**Product Name:** Hydrofluoric Acid, 40%

**Catalog Codes:** 10773, 20773, 40773

**CAS#:** 7664-39-3

**RTECS:** Not applicable.

**TSCA:** TSCA 8(b) inventory: Water; Hydrofluoric acid

**CI#:** Not available.

**Synonym:** Hydrogen Fluoride; Hydrofluoride

**Chemical Name:** Hydrofluoric acid

**Chemical Formula:** Not applicable.

#### Contact Information:

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### Section 2: Composition and Information on Ingredients

#### Composition:

Name	CAS #	% by Weight
Water	7732-18-5	60
Hydrogen fluoride	7664-39-3	40

**Toxicological Data on Ingredients:** Hydrofluoric acid: VAPOR (LC50): Acute: 1276 ppm 1 hours [Rat]. 342 ppm 1 hours [Mouse]. 1774 ppm 1 hours [Monkey]. 4327 ppm 0.5 hours [Guinea pig].

### Section 3: Hazards Identification

#### Potential Acute Health Effects:

Very hazardous in case of skin contact (corrosive, irritant, permeator), of eye contact (irritant, corrosive), of ingestion. Liquid or spray mist may produce tissue damage particularly on mucous membranes of eyes, mouth and respiratory tract. Skin contact may produce burns. Inhalation of the spray mist may produce severe irritation of respiratory tract, characterized by coughing, choking, or shortness of breath. Severe over-exposure can result in death. Inflammation of the eye is characterized by redness, watering, and itching. Skin inflammation is characterized by itching, scaling, reddening, or, occasionally, blistering.

#### Potential Chronic Health Effects:

Non-corrosive for skin. Non-irritant for skin. Non-sensitizer for skin. Non-permeator by skin. Non-irritating to the eyes. Non-hazardous in case of ingestion. Non-hazardous in case of inhalation. Non-irritant for lungs. Non-sensitizer for lungs. CARCINOGENIC EFFECTS: Not available. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance may be toxic to lungs, mucous membranes, skin, eyes, bones,

teeth. Repeated or prolonged exposure to the substance can produce target organs damage. Repeated or prolonged contact with spray mist may produce chronic eye irritation and severe skin irritation. Repeated or prolonged exposure to spray mist may produce respiratory tract irritation leading to frequent attacks of bronchial infection. Repeated exposure to a highly toxic material may produce general deterioration of health by an accumulation in one or many human organs.

#### Section 4: First Aid Measures

##### **Eye Contact:**

Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15-30 minutes. Cold water may be used. Keep the eyelids apart and away from the eyeballs during irrigation. Do not use oily drops or ointment or HF skin burn treatments on the eyes. Get medical attention immediately, preferably an eye specialist. If a physician is not immediately available, apply one or two drops of ophthalmic anesthetic (e.g. 0.5% Pontocaine Hydrochloride solution). Place ice pack on eyes until reaching emergency room.

##### **Skin Contact:**

In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Cover the irritated skin with an emollient. Cold water may be used. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention immediately. While waiting for medical attention, it has been shown that flushing the affected area with water for one minute and then massaging HF Antidote Gel into the wound until there is a cessation of pain is a most effective first aid treatment. HF Antidote Gel contains Calcium Gluconate which combines with HF for insoluble Calcium Fluoride, thus preventing the extraction of calcium from the body tissue and bones. Another alternative first aid treatment, after thorough washing of the burned area, is to immerse the burned area in a solution of 0.2% iced aqueous Hyamine 1622 or 0.13% iced aqueous Zephiran Chloride. If immersion is impractical, towels should be soaked with one of the above solutions and used as compresses for the burn area. Hyamine 1622 is a trade name for Tetracaine Benzethonium Chloride. Zephiran is a trade name for Benzalkonium Chloride. Again, seek medical attention as soon as possible for all burns regardless of how minor they may appear initially.

##### **Serious Skin Contact:**

Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek immediate medical attention.

##### **Inhalation:**

If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention immediately.

##### **Serious Inhalation:**

Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. **WARNING:** It may be hazardous to the person providing aid to give mouth-to-mouth resuscitation when the inhaled material is toxic, infectious or corrosive. Seek immediate medical attention.

##### **Ingestion:**

If swallowed, do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention immediately.

**Serious Ingestion:** Not available.

#### Section 5: Fire and Explosion Data

**Flammability of the Product:** Non-flammable.

**Auto-Ignition Temperature:** Not applicable.

**Flash Points:** Not applicable.

**Flammable Limits:** Not applicable.

**Products of Combustion:** Not available.

**Fire Hazards in Presence of Various Substances:** Not applicable.

**Explosion Hazards in Presence of Various Substances:**

Explosive in presence of metals. Non-explosive in presence of open flames and sparks, of shocks.

**Fire Fighting Media and Instructions:** Not applicable.

**Special Remarks on Fire Hazards:** Hazardous decomposition: May form acid vapors, hydrogen fluoride.

**Special Remarks on Explosion Hazards:**

It's corrosive action on metals can result in formation of hydrogen gas in containers and piping to create explosion hazard. Reacts explosively with Cyanogen fluoride (polymerizes explosively), glycerol plus nitric acid (evolves gas from oxidation), methanesulfonic acid (evolves oxygen difluoride). Hydrofluoric acid reacts with most metals to release hydrogen gas which can form explosive mixtures with air.

## Section 6: Accidental Release Measures

**Small Spill:**

Dilute with water and mop up, or absorb with an inert dry material and place in an appropriate waste disposal container. If necessary: Neutralize the residue with a dilute solution of sodium carbonate.

**Large Spill:**

Corrosive liquid. Poisonous liquid. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. Do not get water inside container. Do not touch spilled material. Use water spray curtain to divert vapor drift. Use water spray to reduce vapors. Prevent entry into sewers, basements or confined areas; dike if needed. Call for assistance on disposal. Neutralize the residue with a dilute solution of sodium carbonate. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

## Section 7: Handling and Storage

**Precautions:**

Do not ingest. Do not breathe gas/fumes/ vapor/spray. Never add water to this product. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes. Keep away from incompatibles such as organic materials, metals, alkalis, moisture. May corrode metallic surfaces and glass. Store in a polyethylene container.

**Storage:** Keep container tightly closed. Keep container in a cool, well-ventilated area.

## Section 8: Exposure Controls/Personal Protection

**Engineering Controls:**

Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the work-station location.

**Personal Protection:**

Face shield. Synthetic (impervious) apron or full suit. A full impervious suit is recommended if exposure is possible to a large portion of the body. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Gloves (impervious - neoprene, nitrile). Impervious Boots.

**Personal Protection in Case of a Large Spill:**

Splash goggles. Full suit (impervious). Vapor respirator. Impervious Boots. Gloves (impervious).. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

**Exposure Limits:**

Hydrogen fluoride STEL: 2.3 (mg/m<sup>3</sup>) from ACGIH (TLV) [United States] STEL: 3 (ppm) from ACGIH (TLV) [United States] CEIL: 6 from NIOSH CEIL: 5 (mg/m<sup>3</sup>) from NIOSH TWA: 3 STEL: 6 (ppm) from OSHA (PEL) [United States] Consult local authorities for acceptable exposure limits.

## Section 9: Physical and Chemical Properties

**Physical state and appearance:** Liquid.

**Odor:** Acrid (Strong.)

**Taste:** Not available.

**Molecular Weight:** Not applicable.

**Color:** Colorless. Clear

**pH (1% soln/water):** <2 [Acidic.]

**Boiling Point:** 108°C (226.4°F)

**Melting Point:** <-36.111°C (-33°F)

**Critical Temperature:** Not available.

**Specific Gravity:** 1.15 - 1.18 (Water = 1)

**Vapor Pressure:** 3.3 kPa (@ 20°C)

**Vapor Density:** 1.97 (Air = 1)

**Volatility:** Not available.

**Odor Threshold:** 0.5-3 ppm

**Water/Oil Dist. Coeff.:** Not available.

**Ionicity (in Water):** Not available.

**Dispersion Properties:** See solubility in water, diethyl ether.

**Solubility:**

Easily soluble in cold water, hot water. Partially soluble in diethyl ether.

## Section 10: Stability and Reactivity Data

**Stability:** The product is stable.

**Instability Temperature:** Not available.

**Conditions of Instability:** Incompatible materials

**Incompatibility with various substances:**

Highly reactive with metals. Reactive with organic materials, alkalis.

**Corrosivity:**

Extremely corrosive in presence of glass, of aluminum, of stainless steel(304), of stainless steel(316). Slightly corrosive in presence of copper.

**Special Remarks on Reactivity:**

Incompatible with glass, ceramics, concrete, alkali materials, and will generate hydrogen gas on contact with metals, leather, rubber, common metals, carbonates, sulfides, cyanides, oxides of silicon, fluorine. Reacts violently with: Acetic anhydride, 2-amino ethanol, Ammonium hydroxide, Arsenic trioxide, Bismuthic acid (produces oxygen), Calcium oxide, Chlorosulfonic acid, Dialuminum octavanadium tridecasilicide, Ethylene diamine, Ethyleneimine, Fluorine, Mercuric oxide, Mercury (II) oxide plus organic materials(above zero degree C), Nitric acid plus lactic acid (mixtures are unstable), Nitric acid plus propylene glycol, Olen-Phenylazopiperidine, Phosphoric anhydride (Phosphorus pentoxide unites with hydrogen fluoride vigorously, even at 19.5 degrees C, HSDB 1990), Potassium permanganate, Potassium tetrafluorosilicate(2-) (evolves silicon tetrafluoride gas), Propiolactone (beta-), Propylene glycol and silver nitrate (gas evolution and formation of silver fulminate), Propylene oxide, Sodium, Sodium hydroxide, Sodium tetrafluorosilicate, Sulfuric acid, Vinyl acetate.

**Special Remarks on Corrosivity:**

It corrodes most substances except lead, wax, polyethylene, and platinum. It will attack some forms of plastics, rubber and coatings. It attacks glass or stoneware, dissolving the silica. Minor corrosive effect on bronze.

**Polymerization:** Will not occur.

## Section 11: Toxicological Information

**Routes of Entry:** Absorbed through skin. Dermal contact. Eye contact. Inhalation. Ingestion.

**Toxicity to Animals:** Acute toxicity of the vapor (LC50): 342 1 hours [Mouse].

**Chronic Effects on Humans:** May cause damage to the following organs: lungs, mucous membranes, skin, eyes, bones, teeth.

**Other Toxic Effects on Humans:**

Extremely hazardous in case of inhalation (lung corrosive). Very hazardous in case of skin contact (corrosive, irritant, permeator), of eye contact (corrosive), of ingestion, .

**Special Remarks on Toxicity to Animals:** Not available.

**Special Remarks on Chronic Effects on Humans:**

May cause adverse reproductive effects (Fetotoxicity) based on animal data. May affect genetic material based on animal data. (Hydrogen fluoride)

**Special Remarks on other Toxic Effects on Humans:**

Acute Potential Health Effects: Skin: Causes severe irritation and burns/irreversible destruction of skin. Readily penetrates skin and mucous membranes. Eyes: Causes severe irritation and burns/irreversible destruction of eyes. Inhalation: Causes severe irritation and burns/irreversible destruction of respiratory tract/lungs. May also affect behavior (change in motor activity, coma), blood, metabolism, sense organs, cardiovascular system (lowering of blood pressure, arrhythmia), urinary system, gastrointestinal tract, respiration, and urinary system. Symptoms may include severe throat irritation, cough, dyspnea, cyanosis, lung injury, and noncardiogenic pulmonary edema. Acute inhalation also depletes calcium levels in the body when can lead to hypocalcemia. Inhalation exposure of 50 ppm for 5 min. may be fatal. Ingestion: Causes severe irritation and burns/irreversible destruction of digestive tract/stomach. Serious gastrointestinal effects may include hematemesis, nausea, and severe abdominal pain, painful necrotic lesions, hemorrhagic gastritis, pancreatitis, local caustic effects to mouth and gastrointestinal tract. Severe systemic toxicity including hypocalcemia, hypomagnesemia, hyperkalemia, ventricular dysrhythmia and death may also occur. Chronic Potential Health Effects: Repeated exposure to airborne concentrations of 3 ppm or less could be tolerated with no apparent ill effects for 6 hours/day for up to 50 days; redness of the skin and irritation and burning of the eyes and nose were noted at airborne concentrations between 3 ppm and 4.7 ppm (ACGIH, 1992). No significant changes in pulmonary function occurred with occupational exposure to airborne levels averaging 1.03 ppm (ACGIH). Effects of chronic exposure by inhalation and ingestion include systemic fluoride toxicity (FLUOROSIS), skeletal/bone structure abnormalities (osteosclerosis, and mottling of the teeth (Clayton & Clayton, 1994; White, 1980; Waldbott & Lee, 1978). Hypocalcemia), metabolic acidosis, chronic bronchitis, pulmonary edema, and death can occur from high-level chronic exposure.

## Section 12: Ecological Information

**Ecotoxicity:** Not available.

**BOD5 and COD:** Not available.

**Products of Biodegradation:**

Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

**Toxicity of the Products of Biodegradation:** The products of degradation are less toxic than the product itself.

**Special Remarks on the Products of Biodegradation:** Not available.

## Section 13: Disposal Considerations

**Waste Disposal:**

Waste must be disposed of in accordance with federal, state and local environmental control regulations.

## Section 14: Transport Information

**DOT Classification:**

CLASS 6.1: Poisonous material. Class 8: Corrosive material

**Identification:** : Hydrofluoric Acid solution (Hydrogen fluoride) UNNA: 1790 PG: II

**Special Provisions for Transport:** Not available

## Section 15: Other Regulatory Information

**Federal and State Regulations:**

Connecticut hazardous material survey.: Listed as Hydrofluoric acid or Hydrogen fluoride Illinois toxic substances disclosure to employee act: Listed as Hydrofluoric acid or Hydrogen fluoride Illinois chemical safety act: Listed as Hydrofluoric acid or Hydrogen fluoride New York release reporting list: Listed as Hydrofluoric acid Rhode Island RTK hazardous substances: Listed as Hydrofluoric acid or Hydrogen fluoride Pennsylvania RTK: Listed as Hydrofluoric acid Minnesota: Hydrogen fluoride Massachusetts RTK: Listed as Hydrogen fluoride Massachusetts spill list: Listed as Hydrofluoric acid or Hydrogen fluoride New Jersey: Listed as Hydrofluoric acid or Hydrogen fluoride New Jersey spill list: Listed as Hydrofluoric acid or Hydrogen fluoride Louisiana RTK reporting list: Listed as Hydrogen fluoride Louisiana spill reporting: Listed as Hydrogen fluoride California Director's List of Hazardous substances: Listed as Hydrofluoric acid or Hydrogen Fluoride TSCA 8(b) inventory: Water; Hydrofluoric acid TSCA 4(a) proposed test rules: Listed as Hydrogen fluoride SARA 302/304/311/312 extremely hazardous substances: Listed as Hydrofluoric acid or Hydrogen fluoride SARA 313 toxic chemical notification and release reporting: Listed as Hydrogen fluoride CERCLA: Hazardous substances.: Listed as Hydrofluoric acid or Hydrogen fluoride: 100 lbs. (45.36 kg)

**Other Regulations:**

OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200). EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances. INTERNATIONAL LISTS: China (National Inventory): Listed as Hydrofluoric acid; Japan (ENCS - National Inventory): Listed as Hydrogen Fluoride; Korea (KECI - National Inventory): Listed as Hydrofluoric acid; Philippines (PICCS - National Inventory): Listed as Hydrofluoric acid

**Other Classifications:****WHMIS (Canada):**

CLASS D-1B: Material causing immediate and serious toxic effects (TOXIC). CLASS E: Corrosive liquid.

**DSCL (EEC):**

R26/27/28- Very toxic by inhalation, in contact with skin and if swallowed. R35- Causes severe burns. S7/9- Keep container tightly closed and in a well-ventilated place. S26- In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. S36/37- Wear suitable protective clothing and gloves. S45- In case of accident or if you feel unwell, seek medical advice immediately (show the

**HMIS (U.S.A.):**

**Health Hazard:** 3

**Fire Hazard:** 0

**Reactivity:** 0

**Personal Protection:**

**National Fire Protection Association (U.S.A.):**

**Health:** 4

**Flammability:** 0

**Reactivity:** 1

**Specific hazard:**

**Protective Equipment:**

Gloves. Synthetic apron. Full suit. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Face shield.

## Section 16: Other Information

**References:** Not available.

**Other Special Considerations:** Not available.

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