MATERIAL SAFETY DATA SHEET

1. Product and Company Identification

Material name	**HYDROFLUORIC ACID**
Version #	08
Revision date	06-09-2011
CAS #	Mixture
Product Codes	**J.T.Baker: 5368, 5659, 5818, 5823, 5824, 5865, 5900, 5901, 6904, 9559, 9560, 9563, 9564, 9567, 9570, 9572, 9573, 9574** **Macron: 20659, 2640, 2648, 72184, 72185, V142, V179**
Synonym(s)	FLUOROHYDRIC ACID * FLUORIC ACID * HYDROGEN FLUORIDE SOLUTION
Manufacturer	Avantor Performance Materials, Inc.
Address	222 Red School Lane Phillipsburg, NJ 08865 US
Customer Service	800-582-2537
24 Hour Emergency	908-859-2151
Chemtrec	800-424-9300

2. Hazards Identification

Emergency overview	DANGER Corrosive. Causes severe skin and eye burns. Causes digestive tract burns. May be fatal if inhaled, absorbed through skin, or swallowed. Mist or vapor extremely irritating to eyes and respiratory tract. Causes blood, cardiovascular system and respiratory system damage. Prolonged exposure may cause chronic effects. Reacts with water.
OSHA regulatory status	This product is considered hazardous under 29 CFR 1910.1200 (Hazard Communication).
Potential health effects	
Routes of exposure	Ingestion. Inhalation. Skin contact. Eye contact.
Eyes	Corrosive. Causes severe eye burns. Vapor or spray may cause eye damage, impaired sight or blindness.
Skin	Corrosive. Causes severe skin burns. This product may be fatal if it is absorbed through the skin. The fluoride ion readily penetrates the skin causing destruction of deep tissue layers and even bone. Symptoms may develop after several hours.
Inhalation	May be harmful if inhaled. Corrosive. May cause damage to mucous membranes in nose, throat, lungs and bronchial system.
Ingestion	Corrosive. May be fatal if swallowed. Ingestion may produce burns to the lips, oral cavity, upper airway, esophagus and possibly the digestive tract.
Target organs	Eyes. Skin. Respiratory system. Blood. Heart and cardiovascular system. Teeth. Bone. Endocrine system.
Chronic effects	Corrosive. Prolonged contact causes serious tissue damage. Intake of more than 6 mg of fluorine per day may result in fluorosis, bone and joint damage. Hypocalcemia and hypomagnesemia can occur from absorption of fluoride ion into blood stream. Symptoms may be delayed.
Potential environmental effects	The product may affect the acidity (pH-factor) in water with risk of harmful effects to aquatic organisms.

3. Composition / Information on Ingredients

Hazardous components	CAS #	Percent
HYDROGEN FLUORIDE	7664-39-3	45- 55

Non-hazardous components	CAS #	Percent
WATER	7732-18-5	45 - 55

4. First Aid Measures

First aid procedures

Eye contact
Immediately flush with plenty of water for at least 15 minutes. If easy to do, remove contact lenses. Call a physician or poison control center immediately. In case of irritation from airborne exposure, move to fresh air. Get medical attention immediately.

Skin contact
Immediately flush with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Call a physician or poison control center immediately. Wash clothing separately before reuse. Destroy or thoroughly clean contaminated shoes.

Inhalation
Move to fresh air. If breathing stops, provide artificial respiration. If breathing is difficult, give oxygen. Call a physician or poison control center immediately.

Ingestion
Call a physician or poison control center immediately. Do not induce vomiting. If vomiting occurs, the head should be kept low so that stomach vomit doesn't enter the lungs.

Notes to physician
Keep victim under observation. Appropriate treatment to help protect the affected person against circulatory shock, respiratory depression, and convulsion may be needed. Symptoms may be delayed.

General advice
In the case of accident or if you feel unwell, seek medical advice immediately (show the label where possible). Show this safety data sheet to the doctor in attendance. Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves.

5. Fire Fighting Measures

Flammable properties
The product is not flammable. Material will react with water and may release a flammable (and/or) toxic gas.

Extinguishing media

Suitable extinguishing media
Carbon dioxide (CO2). Dry chemical powder. Foam.

Unsuitable extinguishing media
The product reacts with water and will generate heat. Addition of water or foam to the fire may cause frothing.

Protection of firefighters

Specific hazards arising from the chemical
Not flammable, but reacts with most metals to form flammable hydrogen gas. Fire may produce irritating, corrosive and/or toxic gases.

Protective equipment and precautions for firefighters
Self-contained breathing apparatus and full protective clothing must be worn in case of fire. Use water spray to cool unopened containers. Cool containers exposed to flames with water until well after the fire is out.

Special protective equipment for fire-fighters
Wear full protective clothing, including helmet, self-contained positive pressure or pressure demand breathing apparatus, protective clothing and face mask. Wear self-contained breathing apparatus with a full facepiece operated in the positive pressure demand mode when fighting fires.

Specific methods
In the event of fire and/or explosion do not breathe fumes.

6. Accidental Release Measures

Personal precautions
Wear appropriate protective equipment and clothing during clean-up. Keep unnecessary personnel away. Keep upwind. Keep out of low areas. Ventilate closed spaces before entering them. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Local authorities should be advised if significant spillages cannot be contained.

Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not contaminate water. Avoid discharge into drains, water courses or onto the ground.

Methods for containment
Stop the flow of material, if this is without risk. Prevent entry into waterways, sewer, basements or confined areas. Dike the spilled material, where this is possible.

Methods for cleaning up

Large Spills: Neutralize spill area and washings with soda ash or lime. Use a non-combustible material like vermiculite, sand or earth to soak up the product and place into a container for later disposal. Dike far ahead of spill for later disposal.

Small Spills: Neutralize spill area and washings with soda ash or lime. Wipe up with absorbent material (e.g. cloth, fleece). Collect in a non-combustible container for prompt disposal.

Never return spills in original containers for re-use. Clean surface thoroughly to remove residual contamination. Clean up in accordance with all applicable regulations.

J. T. Baker Hydrofluoric Acid Emergency Cleanup Kit is recommended for spills of this product.

7. Handling and Storage

Handling

Wear appropriate personal protective equipment. Do not get in eyes, on skin, on clothing. Do not breathe mist or vapor. Do not taste or swallow. Use only with adequate ventilation. Wash thoroughly after handling. Do not eat, drink or smoke when using the product. Use caution when combining with water; DO NOT add water to acid, ALWAYS add acid to water while stirring to prevent release of heat, steam and fumes. See Section 8 of the MSDS for Personal Protective Equipment.

Storage

Do not store in metal containers. Keep tightly closed in a dry, cool and well-ventilated place.

8. Exposure Controls / Personal Protection

Occupational exposure limits

ACGIH

Components	Type	Value
HYDROGEN FLUORIDE (7664-39-3)	BEL	10.0000 mg/g
		3.0000 mg/g
	Ceiling	2.0000 ppm
	TWA	0.5000 ppm
		2.5000 mg/m3

U.S. - OSHA

Components	Type	Value
HYDROGEN FLUORIDE (7664-39-3)	PEL	2.5000 mg/m3
	TWA	3.0000 ppm

Engineering controls

Good general ventilation (typically 10 air changes per hour) should be used. Ventilation rates should be matched to conditions. If applicable, use process enclosures, local exhaust ventilation, or other engineering controls to maintain airborne levels below recommended exposure limits. If exposure limits have not been established, maintain airborne levels to an acceptable level.

Personal protective equipment

Eye / face protection

Wear safety glasses with side shields (or goggles) and a face shield.

Skin protection

Wear appropriate chemical resistant clothing. Wear appropriate chemical resistant gloves.

Respiratory protection

If engineering controls do not maintain airborne concentrations below recommended exposure limits (where applicable) or to an acceptable level (in countries where exposure limits have not been established), an approved respirator must be worn. Chemical respirator with specific cartridge and full facepiece providing protection against the compound of concern.

General hygeine considerations

Provide eyewash station and safety shower. Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants.

General

Wear chemical protective equipment that is specifically recommended by the manufacturer. Launder contaminated clothing before reuse.

9. Physical & Chemical Properties

Appearance

Fuming liquid.

Color	Colorless.
Odor	Strong. Irritating.
Odor threshold	Not available.
Physical state	Liquid.
Form	Liquid.
pH	1 (0.1 M Solution)
Melting point	-32.8 °F (-36 °C)
Freezing point	-32.8 °F (-36 °C)
Boiling point	226.4 °F (108 °C)
Flash point	Not available.
Evaporation rate	Not available.
Flammability limits in air, upper, % by volume	Not available.
Flammability limits in air, lower, % by volume	Not available.
Vapor pressure	3.33 kPa
Specific gravity	1.18
Relative density	Not available.
Solubility (water)	Miscible
Partition coefficient (n-octanol/water)	Not available
Auto-ignition temperature	Not available.
Decomposition temperature	Not available.
Molecular weight	20.01
Molecular formula	HF

10. Chemical Stability & Reactivity Information

Chemical stability	Stable under normal temperature conditions. Instability caused by elevated temperatures.
Conditions to avoid	Heat. Water, moisture.
Incompatible materials	Strong oxidizing agents. Acids. Bases, alkalies (organic). Ammonia. Sodium hydroxide. Sulfuric acid. Vinyl acetate. Organic compounds. Glass. Fluorine. Cyanides. Metals. Alkaline metals. May attack some plastics, rubber and coatings. Contact with water rapidly liberates toxic gas.
Hazardous decomposition products	Hydrogen fluoride.
Possibility of hazardous reactions	Hazardous polymerization does not occur.

11. Toxicological Information

Sensitization Not a skin sensitizer.

US ACGIH Threshold Limit Values: Skin designation

HYDROGEN FLUORIDE (CAS 7664-39-3) Can be absorbed through the skin.

Acute effects May be fatal if inhaled, absorbed through skin, or swallowed.

Local effects Causes severe burns. Mist or vapor extremely irritating to eyes and respiratory tract. Causes blood, cardiovascular system and respiratory system damage.

Chronic effects Corrosive. Prolonged contact causes serious tissue damage. Intake of more than 6 mg of fluorine per day may result in fluorosis, bone and joint damage. Hypocalcemia and hypomagnesemia can occur from absorption of fluoride ion into blood stream. Symptoms may be delayed.

Carcinogenicity This product is not considered to be a carcinogen by IARC, ACGIH, NTP, or OSHA.

ACGIH Carcinogens

HYDROGEN FLUORIDE (CAS 7664-39-3) A4 Not classifiable as a human carcinogen.

IARC Monographs. Overall Evaluation of Carcinogenicity

HYDROGEN FLUORIDE (CAS 7664-39-3) 3 Not classifiable as to carcinogenicity to humans.

Skin corrosion/irritation Corrosive to skin and eyes. The fluoride ion readily penetrates the skin causing destruction of deep tissue layers and even bone. Symptoms may develop after several hours.

Epidemiology No epidemiological data is available for this product.

Mutagenicity No data available to indicate product or any components present at greater than 0.1% are mutagenic or genotoxic.

Neurological effects No data available for this product.

Reproductive effects Contains no ingredient listed as toxic to reproduction

Teratogenicity No data available for this product.

Symptoms and target organs Corrosive effects. Shortness of breath. Decrease in motor functions. Circulatory collapse.

Further information Danger of very serious irreversible effects. Symptoms may be delayed.

12. Ecological Information

Ecotoxicity The product may affect the acidity (pH-factor) in water with risk of harmful effects to aquatic organisms.

Environmental effects An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.

Persistence and degradability Expected to be readily biodegradable.

Partition coefficient (n-octanol/water) Not available

13. Disposal Considerations

Waste codes

US RCRA Hazardous Waste U List: Reference

HYDROGEN FLUORIDE (CAS 7664-39-3) U134

Disposal instructions Dispose of this material and its container to hazardous or special waste collection point. Incinerate the material under controlled conditions in an approved incinerator. All wastes must be handled in accordance with local, state and federal regulations.

Contaminated packaging Since emptied containers retain product residue, follow label warnings even after container is emptied. Offer rinsed packaging material to local recycling facilities.

14. Transport Information

DOT

Basic shipping requirements:

UN number UN1790
Proper shipping name Hydrofluoric acid (RQ = 200 LBS)
Hazard class 8
Subsidiary hazard class 6.1
Packing group II
Additional information:
Special provisions A6, A7, B15, IB2, N5, N34, T8, TP2, TP12
Basic shipping requirements:
Labels required 8, 6.1
Additional information:
Packaging exceptions 154
Packaging non bulk 202
Packaging bulk 243
ERG number 157

IATA

Basic shipping requirements:

UN number	1790
Proper shipping name	Hydrofluoric acid
Hazard class	8
Subsidiary hazard class	6.1
Packing group	II
Additional information:	
ERG code	8P

IMDG

Basic shipping requirements:

UN number	1790
Proper shipping name	HYDROFLUORIC ACID
Hazard class	8
Subsidiary hazard class	6.1
Packing group	II

DOT

IATA

IMDG

15. Regulatory Information

US federal regulations

This product is a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.
All components are on the U.S. EPA TSCA Inventory List.

US EPCRA (SARA Title III) Section 302 - Extremely Hazardous Spill: Reportable quantity

HYDROGEN FLUORIDE (CAS 7664-39-3)	100 LBS

US EPCRA (SARA Title III) Section 302 - Extremely Hazardous Substance: Threshold Planning Quantity

HYDROGEN FLUORIDE (CAS 7664-39-3)	100 LBS

US EPCRA (SARA Title III) Section 313 - Toxic Chemical: De minimis concentration

HYDROGEN FLUORIDE (CAS 7664-39-3)	1.0 %

US EPCRA (SARA Title III) Section 313 - Toxic Chemical: Listed substance

HYDROGEN FLUORIDE (CAS 7664-39-3)	Listed.

CERCLA (Superfund) reportable quantity

HYDROGEN FLUORIDE: 100.0000

Superfund Amendments and Reauthorization Act of 1986 (SARA)

Hazard categories	Immediate Hazard - Yes Delayed Hazard - Yes Fire Hazard - No Pressure Hazard - No Reactivity Hazard - No
Section 311 hazardous chemical	Yes

Inventory status

Country(s) or region	Inventory name	On inventory (yes/no)*
Australia	Australian Inventory of Chemical Substances (AICS)	Yes
Canada	Domestic Substances List (DSL)	Yes

Country(s) or region	Inventory name	On inventory (yes/no)*
Canada	Non-Domestic Substances List (NDSL)	No
China	Inventory of Existing Chemical Substances in China (IECSC)	Yes
Europe	European Inventory of Existing Commercial Chemical Substances (EINECS)	Yes
Europe	European List of Notified Chemical Substances (ELINCS)	No
Japan	Inventory of Existing and New Chemical Substances (ENCS)	Yes
Korea	Existing Chemicals List (ECL)	Yes
New Zealand	New Zealand Inventory	Yes
Philippines	Philippine Inventory of Chemicals and Chemical Substances (PICCS)	Yes
United States & Puerto Rico	Toxic Substances Control Act (TSCA) Inventory	Yes

*A "Yes" indicates that all components of this product comply with the inventory requirements administered by the governing country(s)

State regulations

This product does not contain a chemical known to the State of California to cause cancer, birth defects or other reproductive harm.

US - New Jersey Community RTK (EHS Survey): Reportable threshold

HYDROGEN FLUORIDE (CAS 7664-39-3)	100 LBS
	500 LBS

US - Pennsylvania RTK - Hazardous Substances: Listed substance

HYDROGEN FLUORIDE (CAS 7664-39-3)	Listed.

Saf-T-Data

Health: 4 - Extreme (Poison)
Flammability: 0 - None
Reactivity: 2 - Moderate
Contact: 4 - Extreme (Corrosive)
Lab Protective Equip: D - GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD; PROPER GLOVES
Storage Color Code: W - White (Corrosive)

16. Labeling Info

Label Hazard Warning

DANGER

Corrosive. Causes severe skin and eye burns. Causes digestive tract burns. May be fatal if inhaled, absorbed through skin, or swallowed. Mist or vapor extremely irritating to eyes and respiratory tract. Causes blood, cardiovascular system and respiratory system damage. Prolonged exposure may cause chronic effects. Material reacts with water.

Label Precautions

Do not breathe mist or vapor. Do not get in eyes, on skin, or on clothing. Do not ingest. Use only with adequate ventilation. Wash thoroughly after handling. Container must be kept tightly closed.

Label First Aid

Immediately flush eyes with plenty of water for at least 15 minutes. Immediately flush skin with plenty of water. If gas/fume/vapor/dust/mist from the material is inhaled, remove the affected person immediately to fresh air. Oxygen or artificial respiration if needed. Call a physician or poison control center immediately. IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician. Do not induce vomiting without advice from poison control center. If vomiting occurs, keep head low so that stomach content doesn't get into the lungs. Do not use mouth-to-mouth method if victim inhaled the substance.

17. Other Information

NFPA ratings

Health: 4
Flammability: 0
Instability: 1

Disclaimer	THE INFORMATION PRESENTED IN THIS MATERIAL SAFETY DATA SHEET (MSDS/SDS) WAS PREPARED BY TECHNICAL PERSONNEL BASED ON DATA THAT THEY BELIEVE IN THEIR GOOD FAITH JUDGMENT IS ACCURATE. HOWEVER, THE INFORMATION PROVIDED HEREIN IS PROVIDED “AS IS,” AND AVANTOR PERFORMANCE MATERIALS MAKES AND GIVES NO REPRESENTATIONS OR WARRANTIES WHATSOEVER, AND EXPRESSLY DISCLAIMS ALL WARRANTIES REGARDING SUCH INFORMATION AND THE PRODUCT TO WHICH IT RELATES, WHETHER EXPRESS, IMPLIED, OR STATUTORY, INCLUDING WITHOUT LIMITATION, WARRANTIES OF ACCURACY, COMPLETENESS, MERCHANTABILITY, NON-INFRINGEMENT, PERFORMANCE, SAFETY, SUITABILITY, STABILITY, AND FITNESS FOR A PARTICULAR PURPOSE, AND ANY WARRANTIES ARISING FROM COURSE OF DEALING, COURSE OF PERFORMANCE, OR USAGE OF TRADE. THIS MSDS/SDS IS INTENDED ONLY AS A GUIDE TO THE APPROPRIATE PRECAUTIONARY HANDLING OF THE MATERIAL BY A PROPERLY TRAINED PERSON USING THIS PRODUCT, AND IS NOT INTENDED TO BE COMPREHENSIVE AS TO THE MANNER AND CONDITIONS OF USE, HANDLING, STORAGE, OR DISPOSAL OF THE PRODUCT. INDIVIDUALS RECEIVING THIS MSDS/SDS MUST ALWAYS EXERCISE THEIR OWN INDEPENDENT JUDGMENT IN DETERMINING THE APPROPRIATENESS OF SUCH ISSUES. ACCORDINGLY, AVANTOR PERFORMANCE MATERIALS ASSUMES NO LIABILITY WHATSOEVER FOR THE USE OF OR RELIANCE UPON THIS INFORMATION. NO SUGGESTIONS FOR USE ARE INTENDED AS, AND NOTHING HEREIN SHALL BE CONSTRUED AS, A RECOMMENDATION TO INFRINGE ANY EXISTING PATENTS OR TO VIOLATE ANY FEDERAL, STATE, LOCAL, OR FOREIGN LAWS. AVANTOR PERFORMANCE MATERIALS REMINDS YOU THAT IT IS YOUR LEGAL DUTY TO MAKE ALL INFORMATION IN THIS MSDS/SDS AVAILABLE TO YOUR EMPLOYEES.
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This data sheet contains changes from the previous version in section(s):	This document has undergone significant changes and should be reviewed in its entirety.