1. PRODUCT AND COMPANY IDENTIFICATION

Product Name: Hydrofluoric acid, 48 - 51%
Cat No.: AC223330000; AC223330025; AC223330250; AC223335000
Synonyms: Hydrofluoric acid solution; Fluohydric acid; Fluoric acid
Recommended Use: Laboratory chemicals

2. HAZARDS IDENTIFICATION

DANGER!

Emergency Overview:
May be fatal if inhaled, absorbed through skin, or swallowed. Causes severe burns by all exposure routes. Corrosive to metals.

Appearance: Colorless
Physical State: Liquid
odor: pungent

Target Organs: Respiratory system, Eyes, Skin, Gastrointestinal tract (GI), Kidney, skeletal system

Acute Effects

Principle Routes of Exposure
Eyes
Causes severe burns. May cause blindness or permanent eye damage.

Skin
May be fatal if absorbed through skin. Causes severe burns.

Inhalation
May be fatal if inhaled. Causes severe burns.

Ingestion
May be fatal if swallowed. Causes severe burns.

Chronic Effects
May cause skeletal effects and bone destruction. Experiments have shown reproductive toxicity effects on laboratory animals. May cause adverse kidney effects.

See Section 11 for additional Toxicological information.

Aggravated Medical Conditions
No information available.

3. COMPOSITION/INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>Haz/Non-haz</th>
<th>Component</th>
<th>CAS-No</th>
<th>Weight %</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Hydrogen fluoride</td>
<td>7664-39-3</td>
<td>40-62</td>
</tr>
<tr>
<td></td>
<td>Water</td>
<td>7732-18-5</td>
<td>38-60</td>
</tr>
</tbody>
</table>

4. FIRST AID MEASURES

Eye Contact
Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Immediate medical attention is required.

Skin Contact
Wash off immediately with plenty of water for at least 15 minutes. Immediate medical attention is required.

Inhalation
Move to fresh air. If breathing is difficult, give oxygen. Do not use mouth-to-mouth resuscitation if victim ingested or inhaled the substance; induce artificial respiration with a respiratory medical device. Immediate medical attention is required.

Ingestion
Do not induce vomiting. Call a physician immediately.

Notes to Physician
Treat symptomatically.

5. FIRE-FIGHTING MEASURES

Flash Point
Method
No information available.

Autoignition Temperature
No information available.

Explosion Limits
Upper
No data available
Lower
No data available

Suitable Extinguishing Media
CO₂, dry chemical, dry sand, alcohol-resistant foam.

Unsuitable Extinguishing Media
No information available.

Hazardous Combustion Products

Sensitivity to mechanical impact
No information available.

Sensitivity to static discharge
No information available.
Specific Hazards Arising from the Chemical
Thermal decomposition can lead to release of irritating gases and vapors.

Protective Equipment and Precautions for Firefighters
As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

NFPA Health 4 Flammability 0 Instability 1 Physical hazards N/A

6. ACCIDENTAL RELEASE MEASURES

Personal Precautions
Use personal protective equipment. Evacuate personnel to safe areas. Keep people away from and upwind of spill/leak. Do not get in eyes, on skin, or on clothing.

Environmental Precautions
Should not be released into the environment.

Methods for Containment and Clean Up
Wear self-contained breathing apparatus and protective suit. Soak up with inert absorbent material. Keep in suitable and closed containers for disposal.

7. HANDLING AND STORAGE

Handling
Use only under a chemical fume hood. Wear personal protective equipment. Do not breathe vapors or spray mist. Do not get in eyes, on skin, or on clothing. Do not ingest.

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

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Engineering Measures
Use only under a chemical fume hood. Ensure adequate ventilation, especially in confined areas. Ensure that eyewash stations and safety showers are close to the workstation location.

Exposure Guidelines

<table>
<thead>
<tr>
<th>Component</th>
<th>ACGIH TLV</th>
<th>OSHA PEL</th>
<th>NIOSH IDLH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydrogen fluoride</td>
<td>TWA: 0.5 ppm Ceiling: 2 ppm Skin</td>
<td>TWA: 3 ppm</td>
<td>IDLH: 30 ppm TWA: 3 ppm TWA: 2.5 mg/m³ Ceiling: 5 mg/m³ Ceiling: 6 ppm</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Component</th>
<th>Quebec</th>
<th>Mexico OEL (TWA)</th>
<th>Ontario TWAEV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydrogen fluoride</td>
<td>Ceiling: 2.6 mg/m³</td>
<td>Peak: 3 ppm Peak: 2.5 mg/m³</td>
<td>TWA: 0.5 ppm CEV: 2 ppm</td>
</tr>
</tbody>
</table>

NIOSH IDLH: Immediately Dangerous to Life or Health

Personal Protective Equipment

Eye/face Protection
Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA’s eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166

Skin and body protection
Wear appropriate protective gloves and clothing to prevent skin exposure.

Respiratory Protection
Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.
9. PHYSICAL AND CHEMICAL PROPERTIES

- **Physical State**: Liquid
- **Appearance**: Colorless
- **odor**: pungent
- **Odor Threshold**: No information available.
- **pH**: < 2.0
- **Vapor Pressure**: No information available.
- **Vapor Density**: 2.21 (Air = 1.0)
- **Viscosity**: No information available.
- **Boiling Point/Range**: 105°C / 221°F
- **Melting Point/Range**: -35°C / -31°F
- **Decomposition temperature**: No information available.
- **Flash Point**: No information available.
- **Evaporation Rate**: No information available.
- **Specific Gravity**: 1.15-1.20
- **Solubility**: No information available.
- **log Pow**: No data available
- **Molecular Weight**: 20
- **Molecular Formula**: H F

10. STABILITY AND REACTIVITY

- **Stability**: Stable under normal conditions.
- **Conditions to Avoid**: Incompatible products. Excess heat.
- **Incompatible Materials**: Water, Metals, Cyanides, Sulfides, Acids, Strong bases
- **Hazardous Decomposition Products**: Gaseous hydrogen fluoride (HF). Thermal decomposition can lead to release of irritating gases and vapors
- **Hazardous Polymerization**: Hazardous polymerization does not occur.
- **Hazardous Reactions**: None under normal processing.

11. TOXICOLOGICAL INFORMATION

**Acute Toxicity**

<table>
<thead>
<tr>
<th>Component Information</th>
<th>LD50 Oral</th>
<th>LD50 Dermal</th>
<th>LC50 Inhalation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydrogen fluoride</td>
<td>Not listed</td>
<td>Not listed</td>
<td>1276 ppm ( Rat ) 1 h</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>850 mg/m³ ( Rat ) 1 h</td>
</tr>
</tbody>
</table>

- **Irritation**: Causes severe burns by all exposure routes
- **Toxicologically Synergistic Products**: No information available.
Chronic Toxicity

Carcinogenicity There are no known carcinogenic chemicals in this product

Sensitization No information available.

Mutagenic Effects Mutagenic effects have occurred in experimental animals.

Reproductive Effects Experiments have shown reproductive toxicity effects on laboratory animals.

Developmental Effects No information available.

Teratogenicity Teratogenic effects have occurred in experimental animals.

Other Adverse Effects See actual entry in RTECS for complete information.

Endocrine Disruptor Information No information available

12. ECOLOGICAL INFORMATION

Ecotoxicity
Do not empty into drains.

<table>
<thead>
<tr>
<th>Component</th>
<th>Freshwater Algae</th>
<th>Freshwater Fish</th>
<th>Microtox</th>
<th>Water Flea</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydrogen fluoride</td>
<td>Not listed</td>
<td>Not listed</td>
<td>Not listed</td>
<td>EC50 48 h 270 mg/L</td>
</tr>
</tbody>
</table>

Persistence and Degradability No information available

Bioaccumulation/ Accumulation No information available

Mobility

<table>
<thead>
<tr>
<th>Component</th>
<th>log Pow</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydrogen fluoride</td>
<td>-1.4</td>
</tr>
<tr>
<td>Water</td>
<td>-1.87</td>
</tr>
</tbody>
</table>

13. DISPOSAL CONSIDERATIONS

Waste Disposal Methods Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. Chemical waste generators must also consult local, regional, and national hazardous waste regulations to ensure complete and accurate classification.

<table>
<thead>
<tr>
<th>Component</th>
<th>RCRA - U Series Wastes</th>
<th>RCRA - P Series Wastes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydrogen fluoride - 7664-39-3</td>
<td>U134</td>
<td></td>
</tr>
</tbody>
</table>

14. TRANSPORT INFORMATION

DOT
UN-No UN1790
14. TRANSPORT INFORMATION

Proper Shipping Name: HYDROFLUORIC ACID
Hazard Class: 8
Subsidiary Hazard Class: 6.1
Packing Group: II

TDG
UN-No: UN1790
Proper Shipping Name: HYDROFLUORIC ACID
Hazard Class: 8
Subsidiary Hazard Class: 6.1
Packing Group: II

IATA
UN-No: UN1790
Proper Shipping Name: HYDROFLUORIC ACID
Hazard Class: 8
Subsidiary Hazard Class: 6.1
Packing Group: II

IMDG/IMO
UN-No: UN1790
Proper Shipping Name: HYDROFLUORIC ACID
Hazard Class: 8
Subsidiary Hazard Class: 6.1
Packing Group: II

15. REGULATORY INFORMATION

International Inventories

<table>
<thead>
<tr>
<th>Component</th>
<th>TSCA</th>
<th>DSL</th>
<th>NDSL</th>
<th>EINECS</th>
<th>ELINCS</th>
<th>NLP</th>
<th>PICCS</th>
<th>ENCS</th>
<th>AICS</th>
<th>CHINA</th>
<th>KECL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydrogen fluoride</td>
<td>T</td>
<td>X</td>
<td>-</td>
<td>231-634-8</td>
<td>-</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>KE-20198</td>
<td></td>
</tr>
<tr>
<td>Water</td>
<td>X</td>
<td>X</td>
<td>-</td>
<td>231-791-2</td>
<td>-</td>
<td>X</td>
<td>-</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
</tbody>
</table>

Legend:
X - Listed
E - Indicates a substance that is the subject of a Section 5(e) Consent order under TSCA.
F - Indicates a substance that is the subject of a Section 5(f) Rule under TSCA.
N - Indicates a polymeric substance containing no free-radical initiator in its inventory name but is considered to cover the designated polymer made with any free-radical initiator regardless of the amount used.
P - Indicates a commenced PMN substance
R - Indicates a substance that is the subject of a Section 6 risk management rule under TSCA.
S - Indicates a substance that is identified in a proposed or final Significant New Use Rule
T - Indicates a substance that is the subject of a Section 4 test rule under TSCA.
XU - Indicates a substance exempt from reporting under the Inventory Update Rule, i.e. Partial Updating of the TSCA Inventory Data Base Production and Site Reports (40 CFR 710(B).
Y1 - Indicates an exempt polymer that has a number-average molecular weight of 1,000 or greater.
Y2 - Indicates an exempt polymer that is a polyester and is made only from reactants included in a specified list of low concern reactants that comprises one of the eligibility criteria for the exemption rule.

U.S. Federal Regulations

TSCA 12(b)  Not applicable

SARA 313

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS-No</th>
<th>Weight %</th>
<th>SARA 313 - Threshold Values %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydrogen fluoride</td>
<td>7664-39-3</td>
<td>40-62</td>
<td>1.0</td>
</tr>
</tbody>
</table>

SARA 311/312 Hazardous Categorization

- Acute Health Hazard: Yes
- Chronic Health Hazard: Yes
- Fire Hazard: No
- Sudden Release of Pressure Hazard: No
- Reactive Hazard: No

Clean Water Act

<table>
<thead>
<tr>
<th>Component</th>
<th>CWA - Hazardous Substances</th>
<th>CWA - Reportable Quantities</th>
<th>CWA - Toxic Pollutants</th>
<th>CWA - Priority Pollutants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydrogen fluoride</td>
<td>X</td>
<td>100 lb</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Clean Air Act

<table>
<thead>
<tr>
<th>Component</th>
<th>HAPS Data</th>
<th>Class 1 Ozone Depletors</th>
<th>Class 2 Ozone Depletors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydrogen fluoride</td>
<td>X</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

OSHA

<table>
<thead>
<tr>
<th>Component</th>
<th>Specifically Regulated Chemicals</th>
<th>Highly Hazardous Chemicals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydrogen fluoride</td>
<td>-</td>
<td>TQ: 1000 lb</td>
</tr>
</tbody>
</table>

CERCLA

This material, as supplied, contains one or more substances regulated as a hazardous substance under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302)

<table>
<thead>
<tr>
<th>Component</th>
<th>Hazardous Substances RQs</th>
<th>CERCLA EHS RQs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydrogen fluoride</td>
<td>100 lb</td>
<td>100 lb</td>
</tr>
</tbody>
</table>

California Proposition 65

This product does not contain any Proposition 65 chemicals.

State Right-to-Know

<table>
<thead>
<tr>
<th>Component</th>
<th>Massachusetts</th>
<th>New Jersey</th>
<th>Pennsylvania</th>
<th>Illinois</th>
<th>Rhode Island</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydrogen fluoride</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

U.S. Department of Transportation

Reportable Quantity (RQ): N
U.S. Department of Homeland Security
This product contains the following DHS chemicals:

<table>
<thead>
<tr>
<th>Component</th>
<th>DHS Chemical Facility Anti-Terrorism Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydrogen fluoride</td>
<td>750 lb STQ (50% concentration or greater)</td>
</tr>
</tbody>
</table>

Other International Regulations

Mexico - Grade
No information available

Canada
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all the information required by the CPR.

WHMIS Hazard Class
D1A Very toxic materials
D2A Very toxic materials
E Corrosive material

16. OTHER INFORMATION

Prepared By Regulatory Affairs
Thermo Fisher Scientific
Tel: (412) 490-8929

Creation Date 06-Jul-2010
Print Date 06-Jul-2010
Revision Summary "***", and red text indicates revision

Disclaimer
The information provided on this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guide for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered as a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other material or in any process, unless specified in the text.

End of MSDS