1. PRODUCT AND COMPANY IDENTIFICATION

1.1. Identification of the substance/preparation

<table>
<thead>
<tr>
<th>Product Name</th>
<th>Fluorosilicic Acid, 23-25%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemical Name</td>
<td>Silicate (2-) Hexafluoro-dihydrogen</td>
</tr>
<tr>
<td>Synonyms</td>
<td>Hydrofluorosilicic acid, fluosilicic acid, HFS, FSA</td>
</tr>
<tr>
<td>Chemical Formula</td>
<td>H$_2$SiF$_6$</td>
</tr>
<tr>
<td>Molecular Weight</td>
<td>144</td>
</tr>
<tr>
<td>CAS Number</td>
<td>16961-83-4</td>
</tr>
<tr>
<td>Grades/Trade Names</td>
<td>None</td>
</tr>
</tbody>
</table>

1.2. Use of the Substance/Preparation

Recommended use: Chemical intermediates, Water fluoridation

1.3. Company/Undertaking Identification

Address:
Solvay Fluorides, LLC
PO BOX 27328 Houston, TX 77227-7328
3333 Richmond Ave. Houston, Texas 77098

1.4. Emergency telephone numbers

General: 1-877-765-8292 (Solvay Chemicals, Inc.,)
All Emergencies (USA): 1-800-424-9300 (CHEMTREC+)
Transportation Emergencies (INTERNATIONAL/MARITIME): 1-703-527-3887 (CHEMTREC+)
Transportation Emergencies (CANADA): 1-613-996-6666 (CANUTEC)
Transportation Emergencies (MEXICO-SETIQ): 01-800-00-214-00 (MEX. REPUBLIC)
525-559-1588 (Mexico City and metro area)

2. HAZARDS IDENTIFICATION

2.1. Emergency Overview:

*General Information*

- Appearance: liquid
- Color: colorless
- Odor: pungent

*Main effects*
- Corrosive product, very hazardous to human health and the environment.
- Presents hazards from its ionizing fluorine.
- In case of decomposition, releases hydrogen fluoride.
- Toxic by inhalation, in contact with skin and if swallowed.
- Risk of cardiac and nervous disorders.
- Causes burns.
- Chronic exposure (to the product) at high concentrations can cause bone fluorosis.
Seriousness of lesions and prognosis of intoxication depend directly on the concentration and duration of exposure.

2.2. Potential Health Effects:

Inhalation
- Severe respiratory irritant
- Spasmodic cough and difficulty in breathing.
- Risk of chemical pneumonitis and pulmonary (o)edema.
- At high concentrations, risk of hypocalcemia with nervous problems (tetany) and cardiac arrhythmia.
- In case of repeated or prolonged exposure: risk of sore throat, nose bleeds, chronic bronchitis.

Eye contact
- Severe eye irritation, watering, redness and swelling of the eyelids.
- Burns
- Risk of serious or permanent eye lesions.
- May cause blindness.
- Intoxication hazards by inhalation of the product simultaneously.

Skin contact
- Painful irritation, redness and swelling of the skin.
- Severe burns; slow healing.
- Risk of shock.
- Risk of hypocalcemia following the extent of the lesions.
- Intoxication hazards by inhalation of the product simultaneously.

Ingestion
- If ingested, severe burns of the mouth and throat, as well as a danger of perforation of the esophagus and the stomach.
- Risk of throat (o)edema and suffocation.
- Nausea, vomiting (bloody), abdominal cramps and diarrhea (bloody).
- Cough and difficulty breathing.
- Risk of chemical pneumonitis from product inhalation.
- Risk of hypocalcemia with nervous disorders (tetany) and cardiac rhythm disorders.
- Risk of convulsions, loss of consciousness, deep coma and cardiopulmonary arrest.
- Risk of general symptoms having a severe prognosis.

Other toxicity effects
See section 11: Toxicological Information

2.3. Environmental Effects:
See section 12: Ecological Information

3. COMPOSITION OF/INFORMATION ON INGREDIENTS

Hexafluorosilicic acid
- CAS-No.: 16961-83-4
- Concentration: 23-25%

Water
- CAS-No.: 7732-18-5
- Concentration: Balance

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MSDS HFS23-0307/4/4/2007 USA/Issuing date 03/31/07
FDS P15330/UK Report version 1.4 03/08/2006
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4. FIRST AID MEASURES

4.1. Inhalation
- In case of accident by inhalation: remove casually to fresh air and keep at rest.
- Oxygen or cardiopulmonary resuscitation if necessary.
- Victim to lie down in the recovery position, cover and keep him warm.
- Consult a physician.
- Take victim immediately to hospital.

4.2. Eye contact
- Immediate medical attention is required.
- Take victim immediately to hospital.
- Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes.
- In the case of difficulty of opening the lids, administer an analgesic eye wash (oxybuprocaine).

4.3. Skin contact
- Call a physician immediately.
- Take victim immediately to hospital.
- Immediately bring the clothed subject under the shower.
- Remove contaminated shoes, socks and clothing; wash the affected skin with running water.
- Keep warm (blanket), provide clean clothing.

4.4. Ingestion
The following actions are recommended:
- Call a physician immediately.
- Take victim immediately to hospital.
If victim is conscious:
- If swallowed, rinse mouth with water (only if the person is conscious).
- Do not give anything to drink.
- Do NOT induce vomiting.
- If the subject presents nervous, respiratory or cardiovascular disorders: administer oxygen.
If victim is unconscious but breathing:
- Artificial respiration and/or oxygen may be necessary.

5. FIRE-FIGHTING MEASURES

5.1. Suitable extinguishing media
- Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.

5.2. Extinguishing media which must not be used for safety reasons
- Never use water.

5.3. Special exposure hazards in a fire
- Non-combustible/non-flammable but may produce dangerous fumes if involved in fire.
- Contact with water liberates hazardous gas.
- Formation of flammable gas on contact with certain metals (see 10).

5.4. Special protective equipment for fire-fighters
- Evacuate personnel to safe areas.
- Intervention only by capable personnel who are trained and aware of the hazards of the product.
- Wear self-contained breathing apparatus and protective suit.
- Wear chemical resistant coveralls.
- Protect intervention team with a water spray as they approach the fire.
- Clean contaminated surface thoroughly.

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5.5. Other information
- Cool containers / tanks with water spray.
- Approach from upwind.
- Suppress (knock down) gases/vapors/mists with a water spray jet.
- After the fire, proceed rapidly to clean the surfaces exposed to the fumes in order to limit the damage to the equipment.
- As for any fire, ventilate and clean the rooms before re-entry.

6. ACCIDENTAL RELEASE MEASURES

6.1. Personal precautions
- Refer to protective measures listed in sections 7 and 8.
- Isolate the area.
- Approach from upwind.
- Ventilate the area.
- Keep away from incompatible products.
- Suppress (knock down) gases/vapors/mists with a water spray jet.
- Protect intervention team with water spray.
- Prevent further leakage or spillage if safe to do so.

6.2. Environmental precautions
- If the product contaminates rivers and lakes or drains inform respective authorities.
- Do not flush into surface water or sanitary sewer system.

6.3. Methods for cleaning up
- If possible, dam large quantities of liquid with sand or earth.
- Prevent product from entering drains.
- Dilute with plenty of water.
- To avoid excessive fuming, do not apply water directly onto the spillage but upstream or on a run off.
- Then,
- Neutralize the product with an alkali (sodium carbonate, lime, ...).
- Treat recovered material as described in the section "Disposal considerations".

7. HANDLING AND STORAGE

7.1. Handling
- Use in closed system.
- Handle small quantities under a lab hood.
- Use only in well-ventilated areas.
- Use only equipment and materials which are compatible with the product.
- Keep away from incompatible products.
- Preferably transfer by pump or gravity.
- For further information, please contact: Supplier

7.2. Storage
- Keep container tightly closed.
- Keep in a cool, well-ventilated place.
- Keep away from heat.
- Keep away from incompatible products.
- Keep in a diked area.

7.2. Packaging material
- Plastic material: PP, PE, PVDF, PTFE, PFA.
- Steel, coated.

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7.3. Other information
- Provide tight electrical equipment well protected against corrosion.
- Refer to protective measures listed in sections 7 and 8.
- Warn people about the dangers of the product.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Fluosilicic acid

8.1 Exposure Limit Values

<table>
<thead>
<tr>
<th>Fluorosilicic acid (as F)</th>
<th>TLV® ACGIH® USA</th>
<th>OSHA PEL</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2.5 mg/m³</td>
<td>2.5 mg/m³</td>
</tr>
</tbody>
</table>

ACGIH® and TLV® are registered trademarks of the American Conference of Governmental Industrial Hygienists.

8.2. Engineering controls
- Provide appropriate exhaust ventilation at machinery.
- Apply technical measures to comply with the occupational exposure limits.
- Refer to protective measures listed in sections 7 and 8.

8.3. Personal protective equipment

8.3.1. Respiratory protection
- In case of emissions and dust clouds/fog/fumes, face mask with appropriate cartridge.
- Self-contained breathing apparatus in medium confinement/insufficient oxygen/in case of large uncontrolled emissions/in all circumstances when the mask and cartridge do not give adequate protection.
- Use only respiratory protection that conforms to international/national standards.

8.3.2. Hand protection
- Wear suitable gloves.
- Recommended materials: Butyl rubber

8.3.3. Eye protection
- Chemical resistant goggles must be worn.

8.3.4. Skin and body protection
- Chemical resistant apron
- Apron/boots of butyl rubber if risk of splashing.

8.3.5. Hygiene measures
- Shower and eye wash stations.
- Contaminated equipment (brushes, rags) must be cleaned immediately with water.
- Take off contaminated clothing immediately after work.
- Prohibit contact with any leather object
- Handle in accordance with good industrial hygiene and safety practice.
- High standards of skin care and personal hygiene should be exercised at all times.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1. General Information

| Appearance | liquid |
| Color      | colorless |
| Odor       | pungent |

9.2. Important Health Safety and Environmental Information
Boiling point/range: 108.5 °C (227.3 °F)
Remarks: no data available

Flash point: Remarks: The product is not flammable.

Flammability: Remarks: With certain materials (see section 10).

Explosive properties: from 30 hPa
Temperatures: 20 °C (68°F)

Vapor pressure: 1.32
Temperatures: 20 °C (68°F)

Relative density / Density: > 1

Solubility: water
Remarks: completely miscible

Partition coefficient (n-octanol/water): Not applicable

Vapor density: > 1

9.3. Other data

Freezing point: < -30 °C (-22 °F)
Decomposition temperature: 108 °C (226 °F)

10. STABILITY AND REACTIVITY

10.1. Stability
- Reacts violently with water.
- Explosive mixtures in contact with alkaline metals (Na, K, Li, ...).

10.2. Conditions to avoid
- Heating the product to its decomposition temperature (see section 9).

10.3. Materials to avoid
- Metals
- Glass
- Strong oxidizing agents

10.4. Hazardous decomposition products
- Hydrogen
- Hydrogen fluoride

11. TOXICOLOGICAL INFORMATION

Toxicological data

Acute oral toxicity
- LD100, guinea pig, 80 mg/kg (2% solution)

Acute inhalation toxicity

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- LC50, 1 h, rat, 850 - 1,070 mg/m³

**Acute toxicity (other routes of administration)**
- (hydrofluoric acid) – minor impurity (<<1%)

**Irritation (other route)**
- Corrosive

**Chronic toxicity**
- Inhalation, Prolonged exposure, rat, Target Organs: Respiratory system, kidney, liver, eyes. observed effect, (hydrofluoric acid)

**Genetic toxicity in vitro**
- in vitro, Animal testing did not show any mutagenic effects.

**Remarks**
- Corrosive effect linked to acid properties of the product
- Chronic exposure may entail dental or skeletal fluorosis

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**12. ECOLOGICAL INFORMATION**

**12.1. Ecotoxicity effects**

**Acute toxicity**
- Fishes, Salmo gairdneri, LC50, 96 h, 51 mg/l (Fluorides)
- Remarks: 10 mg HF/I: pH = 3.15; 100 mg HF/I: pH = 2.65
- Crustaceans, Daphnia magna, EC50, 48 h, 97 mg/l (Fluorides)
- Remarks: fresh water
- Crustaceans, Mysidopsis bahia, EC50, 96 h, 10.5 mg/l (Fluorides)
- Remarks: salt water

**Chronic toxicity**
- Fishes, Salmo gairdneri, LC50, 21 Days, from 2.7 - 4.7 mg/l (Fluorides)
- Crustaceans, Daphnia magna, NOEC, 21 Days, 3.7 mg/l (Fluorides)
- Algae, Scenedesmus sp., EC50, 96 h, 43 mg/l (Fluorides)

**12.2. Mobility**
- Air
  - Remarks: mobile in aerosol form
- Water
  - Remarks: considerable solubility and mobility
- Soil/sediments (Fluorides)
  - Conditions: slightly acid pH
  - Remarks: adsorption on mineral soil constituents

**12.3. Persistence and degradability**

**Abiotic degradation**
- Air
  - Result: neutralization by natural alkalinity
- Water/soil (Fluorides)
  - Result: complexation/precipitation of inorganic materials
  - Degradation products: aluminum/iron/calcium/phosphate complexes and/or precipitates as a function of pH
- Water/soil
  - Result: ionization/neutralization

**Biodegradation**
- Remarks: The methods for determining biodegradability are not applicable to inorganic substances.
12.4. Bioaccumulative potential
- Bioconcentration: log Pow
  Result: not applicable (ionizable inorganic compound)
- (Fluorides)
  Result: accumulation into vegetable leaves

12.5. Other adverse effects
- No data available

12.6. Remarks
- No specific data
- Harmful to aquatic organisms.
- Hazard for the aquatic environment is limited due to product properties:
  - low chronic toxicity.
- Product fate is highly depending on environmental conditions: pH, temperature, oxidoreductive potential, mineral and organic content of the medium...

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment: Fluorosilicic Acid is not a listed hazardous waste under 40 CFR 261. However, state and local regulations for waste disposal may be more restrictive. Spilled product should be disposed of in an EPA approved disposal facility in accordance with applicable national, state and local environmental laws and regulations.

13.2 Packaging treatment: To avoid treatment, use dedicated containers where possible. Rinse the empty containers and treat the effluent in the same way as waste. Consult current federal, state and local regulations regarding the proper disposal of emptied containers.

13.3 RCRA Hazardous Waste: D002 (Corrosivity)

14. TRANSPORT INFORMATION

<table>
<thead>
<tr>
<th>Mode</th>
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<th>IMDG</th>
<th>IATA</th>
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<td>UN 1778</td>
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<tr>
<td>Class (Subsidiary)</td>
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<td>8</td>
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<tr>
<td>Proper Shipping Name</td>
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<td>Fluorosilicic acid</td>
<td>Fluorosilicic acid</td>
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<tr>
<td>Packing Group</td>
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<td>II</td>
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<tr>
<td>Placard</td>
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<td>Emergency Information</td>
<td>ERG: 154</td>
<td>EmS: F-A, S-B</td>
<td>ERG Code: 8L</td>
</tr>
</tbody>
</table>

15. REGULATORY INFORMATION

15.1 National Regulations (US)
TSCA Inventory 8(b): Yes
SARA Title III Sec. 302/303 Extremely Hazardous Substances (40 CFR355): No
SARA Title III Sec. 311/312 (40 CFR 370): Yes
Hazard Category: None
SARA Title III Sec. 313 Toxic Chemical Emissions Reporting (40 CFR 372): No
CERCLA Hazardous Substance (40CFR Part 302)
Listed: No
Unlisted Substance: Yes, Reportable quantity 100 lbs.
Characteristic: D002 (Corrosivity)

State Component Listing:
State               List
CT   Hazardous Material Survey
MA   Oil and Hazardous Materials List
MA   Right to Know Substance List
NJ   Right to Know Substance List

15.2 National Regulations (Canada):
Canadian NSN Registration: DSL
WHMIS Classification: E- Corrosive
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all the information required by the Controlled Products Regulations.

15.3 National Regulations (Europe):
EINECS / ELINCS #: EINECS: 241-034-8
Labeling according to Directive 92/32/EEC.
Name of dangerous products:

<table>
<thead>
<tr>
<th>Symbols</th>
<th>Phrases</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Xn</td>
<td></td>
<td>Harmful</td>
</tr>
<tr>
<td>R</td>
<td>20/21/22</td>
<td>Harmful by inhalation, in contact with skin and if swallowed.</td>
</tr>
<tr>
<td></td>
<td>36/37/38</td>
<td>Irritating to eyes, respiratory system and skin.</td>
</tr>
<tr>
<td>S</td>
<td>7/9</td>
<td>Keep container tightly closed and in a well ventilated place.</td>
</tr>
<tr>
<td>26</td>
<td></td>
<td>In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.</td>
</tr>
<tr>
<td>36/37</td>
<td></td>
<td>Wear suitable protective clothing and gloves.</td>
</tr>
<tr>
<td>45</td>
<td></td>
<td>In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).</td>
</tr>
</tbody>
</table>
16. OTHER INFORMATION

16.1 Ratings:
   NFPA (NATIONAL FIRE PROTECTION ASSOCIATION)
   Health = 3 Fire = 0 Instability = 1 Special = None
16.2 Other Information:

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Material Safety Data Sheets contain country specific regulatory information; therefore, this MSDS is for use only by customers of Solvay Fluorides, LLC in the United States of America and, if specifically indicated, Canada and Mexico. If the user is located in a country other than the United States, please contact the Solvay Company serving your country for MSDS information applicable to your region.

The previous information is based upon our current knowledge and experience of our product and is not exhaustive. It applies to the product as defined by the specifications. In case of combinations of mixtures, one must confirm that no new hazards are likely to exist. In any case, the user is not exempt from observing all legal, administrative and regulatory procedures relating to the product, personal hygiene, and integrity of the work environment. (Unless noted to the contrary, the technical information applies only to pure product).

TRADEMARKS: All trade name of products referenced herein are either trademarks or registered trademarks of Solvay Fluorides, LLC or its affiliates, unless otherwise identified.

16.3 Reason for revision:
Supersedes edition: Solvay Fluorides LLC MSDS FSA-0305 dated: 3-22-05
Purpose of revision: Periodic Review update; Change format; Split MSDS into two (23% and 40%); Correct PSN (section 14) and correct amount of HF impurity present.