1. Product and Company Identification

Material name: **AMMONIUM FLUORIDE 40% SOLUTION**

<table>
<thead>
<tr>
<th>Version #</th>
<th>01</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revision date</td>
<td>09-30-2010</td>
</tr>
<tr>
<td>CAS #</td>
<td>Mixture</td>
</tr>
<tr>
<td>Product Codes</td>
<td>J.T.Baker: 0702, 0712, 5357, 5864, 5874</td>
</tr>
<tr>
<td>Synonym(s)</td>
<td>Ammonium fluoride solution; neutral ammonium fluoride solution</td>
</tr>
<tr>
<td>Manufacturer</td>
<td>Mallinckrodt Baker, Inc.</td>
</tr>
<tr>
<td>Address</td>
<td>222 Red School Lane, Phillipsburg, NJ 08865</td>
</tr>
<tr>
<td>Customer Service</td>
<td>800-582-2537</td>
</tr>
<tr>
<td>24 Hour Emergency</td>
<td>908-859-2151</td>
</tr>
<tr>
<td>Chemtrec</td>
<td>800-424-9300</td>
</tr>
</tbody>
</table>

2. Hazards Identification

Emergency overview: **DANGER**

May be fatal if swallowed or inhaled. Irritating to eyes, respiratory system and skin. May cause burns. Effects of contact or inhalation may be delayed. Causes central nervous system effects. Harmful if absorbed through skin.

OSHA regulatory status: This product is considered hazardous under 29 CFR 1910.1200 (Hazard Communication).

Potential health effects:

**Routes of exposure**

- **Inhalation**
  May be fatal if inhaled. Vapors irritate the respiratory system, and may cause coughing and difficulties in breathing. Sore throat. Symptoms may be delayed. Do not breathe dust/fume/gas/mist/vapors/spray.

- **Ingestion**
  May be fatal if swallowed. Irritating. May cause nausea, stomach pain and vomiting. Diarrhoea. Ingestion of this product may result in central nervous system stimulation including muscle twitching, generalized weakness, difficulty breathing and coma. Tremors, convulsions. May cause damage to the liver and kidneys. Brain damage. Large doses can lead to respiratory or cardiac arrest and death. Do not ingest.

**Target organs**


**Chronic effects**

Harmful if absorbed through skin. 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. May cause damage to the liver and kidneys. Can cause cardiovascular effects. Causes central nervous system effects.

**Potential environmental effects**

Components of this product are hazardous to aquatic life. May cause long-term adverse effects in the environment.

3. Composition / Information on Ingredients

<table>
<thead>
<tr>
<th>Hazardous components</th>
<th>CAS #</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMMONIUM FLUORIDE</td>
<td>12125-01-8</td>
<td>40</td>
</tr>
</tbody>
</table>
Non-hazardous components

<table>
<thead>
<tr>
<th>CAS #</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>7732-18-5</td>
<td>60</td>
</tr>
</tbody>
</table>

4. First Aid Measures

First aid procedures

**Eye contact**
Immediately flush eyes with plenty of water for at least 15 minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Get medical attention immediately.

**Skin contact**
Immediately flush skin with plenty of water. Remove and isolate contaminated clothing and shoes. Get medical attention immediately. Wash clothing separately before reuse.

**Inhalation**
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. Do not use mouth-to-mouth method if victim inhaled the substance. Induce artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device. Call a physician or poison control center immediately.

**Ingestion**
IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician. Do not induce vomiting without advice from poison control center. Never give anything by mouth to a victim who is unconscious or is having convulsions. Do not use mouth-to-mouth method if victim ingested the substance. Induce artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device. Rinse mouth thoroughly. If vomiting occurs, keep head low so that stomach content doesn't get into the lungs.

**Notes to physician**
In case of shortness of breath, give oxygen. Keep victim warm. Symptoms may be delayed.

**General advice**
Immediate medical attention is required. Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves.

5. Fire Fighting Measures

**Flammable properties**
Not flammable, but reacts with most metals to form flammable hydrogen gas. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion.

**Extinguishing media**
Water. Carbon dioxide (CO2). Foam. Dry chemical powder.

**Protection of firefighters**
In the event of fire, cool tanks with water spray. 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**
As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

**Specific methods**
In the event of fire, cool tanks with water spray. Use water spray to cool unopened containers.

**Hazardous combustion products**
May include oxides of nitrogen.

6. Accidental Release Measures

**Personal precautions**
Ensure adequate ventilation. Keep unnecessary personnel away. Keep upwind. Local authorities should be advised if significant spillages cannot be contained. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Fully encapsulating, vapor protective clothing should be worn for spills and leaks with no fire. Ventilate closed spaces before entering them. Avoid skin contact and inhalation of vapors during disposal of spills.

**Environmental precautions**
Prevent further leakage or spillage if safe to do so. Do not contaminate water.

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

Should not be released into the environment. Do not flush to sewer.

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

Small Spills: Wipe up with absorbent material (e.g. cloth, fleece).

Never return spills in original containers for re-use. Following product recovery, flush area with water. Clean surface thoroughly to remove residual contamination.

7. Handling and Storage

Handling

Do not get this material in contact with eyes. Do not get this material in contact with skin. Do not breathe dust/fume/gas/mist/vapors/spray. Do not use in areas without adequate ventilation. Wear personal protective equipment. Handle and open container with care. Avoid prolonged exposure. Wash thoroughly after handling.

Storage


8. Exposure Controls / Personal Protection

Occupational exposure limits

<table>
<thead>
<tr>
<th>ACGIH Components</th>
<th>Type</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMMONIUM FLUORIDE (12125-01-8)</td>
<td>TWA</td>
<td>2.5000 mg/m3</td>
</tr>
</tbody>
</table>

U.S. - OSHA

<table>
<thead>
<tr>
<th>Components</th>
<th>Type</th>
<th>Value</th>
<th>Form</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMMONIUM FLUORIDE (12125-01-8)</td>
<td>PEL</td>
<td>2.5000 mg/m3</td>
<td>Dust.</td>
</tr>
<tr>
<td></td>
<td>TWA</td>
<td>2.5000 mg/m3</td>
<td></td>
</tr>
</tbody>
</table>

Engineering controls

Ensure adequate ventilation, especially in confined areas. 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. Provide shower facilities near the work place.

Personal protective equipment

Eye / face protection

Chemical goggles are recommended. Face-shield. Do not get in eyes.

Skin protection

Wear appropriate chemical resistant clothing. Chemical resistant gloves. Do not get this material in contact with skin.

Respiratory protection

If airborne concentrations are above the applicable exposure limits, use NIOSH approved respiratory protection. Chemical respirator with acid gas cartridge. Use a positive-pressure air-supplied respirator if there is any potential for an uncontrolled release, exposure levels are not known, or any other circumstances where air-purifying respirators may not provide adequate protection. WARNING! Air-purifying respirators do not protect workers in oxygen deficient atmospheres.

General hygiene considerations

Do not get in eyes. Do not get this material in contact with skin. Do not breathe vapors or spray mist. Do not get this material on clothing. Wash hands before breaks and immediately after handling the product. Keep away from food and drink. Handle in accordance with good industrial hygiene and safety practice.

9. Physical & Chemical Properties

Appearance

Clear.

Color

Colorless.
**Odor**  Slight.

**Odor threshold**  Not available.

**Physical state**  Liquid.

**Form**  Liquid.

**pH**  Not available.

**Melting point**  -22 °F (-30 °C)

**Freezing point**  Not available.

**Boiling point**  228.2 °F (109 °C)

**Flash point**  Not available.

**Evaporation rate**  Not available.

**Flammability**  Not available.

**Flammability limits in air, upper, % by volume**  Not available.

**Flammability limits in air, lower, % by volume**  Not available.

**Vapor pressure**  Not available.

**Vapor density**  Not available.

**Specific gravity**  1.0151 estimated

**Relative density**  Not available.

**Solubility (water)**  Miscible

**Partition coefficient (n-octanol/water)**  Not available

**Auto-ignition temperature**  Not available.

**Decomposition temperature**  Not available.

### 10. Chemical Stability & Reactivity Information

**Chemical stability**  Material is stable under normal conditions.


**Possibility of hazardous reactions**  Hazardous polymerization does not occur.

### 11. Toxicological Information

**Acute effects**  May be fatal if inhaled or swallowed. Harmful if absorbed through skin. Irritating to eyes, respiratory system and skin. May cause burns.

**Chronic effects**  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. Repeated absorption may cause disorder of central nervous system, liver, kidneys and blood.

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

**ACGIH Carcinogens**

- AMMONIUM FLUORIDE (CAS 12125-01-8) A4 Not classifiable as a human carcinogen.

**IARC Monographs. Overall Evaluation of Carcinogenicity**

- AMMONIUM FLUORIDE (CAS 12125-01-8) 3 Not classifiable as to carcinogenicity to humans.

**Skin corrosion/Irritation**  Not available.

**Epidemiology**  Not available.

### 12. Ecological Information

**Ecotoxicity**  Components of this product are hazardous to aquatic life.

**Environmental effects**  Harmful to aquatic organisms.
Persistence and degradability  
Not available.

13. Disposal Considerations

Disposal instructions  
This product, in its present state, when discarded or disposed of, is not a hazardous waste according to Federal regulations (40 CFR 261.4 (b)(4)). Under RCRA, it is the responsibility of the user of the product to determine, at the time of disposal, whether the product meets RCRA criteria for hazardous waste. Dispose in accordance with all applicable regulations. Do not allow this material to drain into sewers/water supplies.

14. Transport Information

DOT

Basic shipping requirements:

<table>
<thead>
<tr>
<th>UN number</th>
<th>UN2505</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proper shipping name</td>
<td>Ammonium fluoride solution</td>
</tr>
<tr>
<td>Hazard class</td>
<td>6.1</td>
</tr>
<tr>
<td>Packing group</td>
<td>III</td>
</tr>
</tbody>
</table>

Additional Information:

| Special provisions | IB8, IP3, T1, TP33 |
| Packaging exceptions | 153 |
| Packaging non bulk | 213 |
| Packaging bulk | 240 |
| ERG number | 154 |

IATA

Basic shipping requirements:

<table>
<thead>
<tr>
<th>UN number</th>
<th>2505</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proper shipping name</td>
<td>Ammonium fluoride Solution</td>
</tr>
<tr>
<td>Hazard class</td>
<td>6.1</td>
</tr>
<tr>
<td>Packing group</td>
<td>III</td>
</tr>
</tbody>
</table>

IMDG

Basic shipping requirements:

<table>
<thead>
<tr>
<th>UN number</th>
<th>2505</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proper shipping name</td>
<td>AMMONIUM FLUORIDE SOLUTION</td>
</tr>
<tr>
<td>Hazard class</td>
<td>6.1</td>
</tr>
<tr>
<td>Packing group</td>
<td>III</td>
</tr>
</tbody>
</table>

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 313 - Toxic Chemical: De minimis concentration

AMMONIUM FLUORIDE (CAS 12125-01-8) 1.0 %

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

AMMONIUM FLUORIDE (CAS 12125-01-8) Listed.

Material name: AMMONIUM FLUORIDE 40% SOLUTION
MSDS US COV
MSDS ID: A5810  Version #: 01  Revision date: 09-30-2010
CERCLA (Superfund) reportable quantity
AMMONIUM 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

<table>
<thead>
<tr>
<th>Country(s) or region</th>
<th>Inventory name</th>
<th>On inventory (yes/no)*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia</td>
<td>Australian Inventory of Chemical Substances (AICS)</td>
<td>Yes</td>
</tr>
<tr>
<td>Canada</td>
<td>Domestic Substances List (DSL)</td>
<td>Yes</td>
</tr>
<tr>
<td>Canada</td>
<td>Non-Domestic Substances List (NDSL)</td>
<td>No</td>
</tr>
<tr>
<td>China</td>
<td>Inventory of Existing Chemical Substances in China (IECSC)</td>
<td>Yes</td>
</tr>
<tr>
<td>Europe</td>
<td>European Inventory of Existing Commercial Chemical Substances (EINECS)</td>
<td>Yes</td>
</tr>
<tr>
<td>Europe</td>
<td>European List of Notified Chemical Substances (ELINCS)</td>
<td>No</td>
</tr>
<tr>
<td>Japan</td>
<td>Inventory of Existing and New Chemical Substances (ENCS)</td>
<td>Yes</td>
</tr>
<tr>
<td>Korea</td>
<td>Existing Chemicals List (ECL)</td>
<td>Yes</td>
</tr>
<tr>
<td>New Zealand</td>
<td>New Zealand Inventory</td>
<td>Yes</td>
</tr>
<tr>
<td>Philippines</td>
<td>Philippine Inventory of Chemicals and Chemical Substances (PICCS)</td>
<td>Yes</td>
</tr>
<tr>
<td>United States &amp; Puerto Rico</td>
<td>Toxic Substances Control Act (TSCA) Inventory</td>
<td>Yes</td>
</tr>
</tbody>
</table>

*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 - Pennsylvania RTK - Hazardous Substances: Listed substance
AMMONIUM FLUORIDE (CAS 12125-01-8) Listed.

Saf-T-Data
Health: 2 - Moderate (Poison)
Flammability: 0 - None
Reactivity: 1 - Slight
Contact: 3 - Severe
Lab Protective Equip: D - GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD; PROPER GLOVES
Storage Color Code: B - Blue (Health)

16. Labeling Info

Label Hazard Warning
DANGER

May be fatal if swallowed or inhaled. Irritating to eyes, respiratory system and skin. May cause burns. Effects of contact or inhalation may be delayed. Causes central nervous system effects. Harmful if absorbed through skin.

Label Precautions
Do not get in eyes, on skin, or on clothing. Do not breathe mist or vapor. Keep container closed. Use only with adequate ventilation. Wash thoroughly after handling.

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. Get medical attention immediately. IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician. Do not induce vomiting without advice from poison control center. Never give anything by mouth to a victim who is unconscious or is having convulsions. If vomiting occurs, keep head low so that stomach content doesn't get into the lungs.
17. Other Information

NFPA ratings

| Health: 2 |
| Flammability: 0 |
| Instability: 0 |

Disclaimer

The information in the sheet was written based on the best knowledge and experience currently available. Mallinckrodt Baker, Inc. provides the information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. This document is intended only as a guide to the appropriate precautionary handling of the material by a properly trained person using this product. Individuals receiving the information must exercise their independent judgment in determining its appropriateness for a particular purpose. MALLINCKRODT BAKER, INC. MAKES NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO THE INFORMATION SET FORTH HEREIN OR THE PRODUCT TO WHICH THE INFORMATION REFERS. ACCORDINGLY, MALLINCKRODT BAKER, INC. WILL NOT BE RESPONSIBLE FOR DAMAGES RESULTING FROM USE OF OR RELIANCE UPON THIS INFORMATION.

Issue date

09-30-2010