1. Product and Company Identification

Material name: Pad Etch 4
Version #: 05
Revision date: 07-08-2009
Product Code: 444-064251, 444-200241
Product use: Industrial use
Manufacturer/Supplier: KMG Electronic Chemicals, Inc.
9555 W. Sam Houston Parkway South
Suite 600
Houston, Texas 77099 US
Phone Number: 713-600-3800
Emergency Phone No.: 1-866-706-3266

2. Hazards Identification

Emergency overview
DANGER
Combustible liquid and vapor.
Corrosive. Causes skin and eye burns. Harmful by inhalation, in contact with skin and if swallowed. Prolonged exposure may cause chronic effects.

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

Potential health effects

Routes of exposure
Inhalation. Ingestion. Skin contact. Eye contact.

Eyes
This product causes eye burns. Risk of serious damage to eyes. Do not get this material in contact with eyes.

Skin
Causes skin burns. Harmful in contact with skin. Do not get this material in contact with skin.

Inhalation
Harmful if inhaled. Causes respiratory tract burns. Do not breathe dust/fume/gas/mist/vapors/spray.

Ingestion
Harmful if swallowed. Components of the product may be absorbed into the body by ingestion. Ingestion may produce burns to the lips, oral cavity, upper airway, esophagus and possibly the digestive tract. Do not ingest.

Target organs
Eyes. Respiratory system. Skin. Gastro-intestinal tract

Chronic effects
Prolonged or repeated contact can result in defatting and drying of the skin which may result in skin irritation and dermatitis (rash).

Signs and symptoms
Symptoms can include irritation, redness, scratching of the cornea, and tearing.

Potential environmental effects
This material is not expected to be harmful to aquatic life.

3. Composition / Information on Ingredients

<table>
<thead>
<tr>
<th>Components</th>
<th>CAS #</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acetic acid</td>
<td>64-19-7</td>
<td>30 - 40</td>
</tr>
<tr>
<td>Ammonium fluoride</td>
<td>12125-01-8</td>
<td>10 - 20</td>
</tr>
<tr>
<td>Propylene glycol</td>
<td>57-55-6</td>
<td>5 - 10</td>
</tr>
</tbody>
</table>

4. First Aid Measures

First aid procedures

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

Skin contact
Immediately flush skin at least 15 minutes with plenty of water. Remove and isolate contaminated clothing and shoes. Get medical attention immediately. For minor skin contact, avoid spreading material on unaffected skin. Wash clothing separately before reuse.
Inhalation
If breathing is difficult, give oxygen. Immediately call a poison control center or doctor for treatment advise. Move person to fresh air. If breathing has ceased, start mouth-to-mouth artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device.

Ingestion
Immediately call a poison control center or doctor for treatment advise. Have person sip a glass of water if able to swallow. Do not give anything by mouth to an unconscious person. Do not induce vomiting unless told to do so by a poison control center or doctor.

Notes to physician
In case of shortness of breath, give oxygen. Keep victim warm.

General advice
In case of shortness of breath, give oxygen. Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves. In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

5. Fire Fighting Measures

Flammable properties
Combustible.

Extinguishing media
Suitable extinguishing media
Water. Dry chemical, foam, carbon dioxide.

Protection of firefighters

Protective equipment and precautions for firefighters
Be aware of danger of fire re-start. Wear full protective clothing, including helmet, self-contained positive pressure or pressure demand breathing apparatus, protective clothing and face mask. If tank, rail car or tank truck is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions; also consider initial evacuation for 800 meters (1/2 mile) in all directions. ALWAYS stay away from tanks engulfed in flame. Fight fire from maximum distance or use unmanned hose holders or monitor nozzles. Withdraw immediately in case of rising sound from venting safety devices or any discoloration of tanks due to fire. Move containers from fire area if you can do it without risk. Use water spray to cool unopened containers. Cool containers with flooding quantities of water until well after fire is out. For massive fire, use unmanned hose holders or monitor nozzles; if this is impossible, withdraw from area and let fire burn. Prevent runoff from fire control or dilution from entering streams, sewers, or drinking water supply.

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

6. Accidental Release Measures

Personal precautions
Keep unnecessary personnel away. Local authorities should be advised if significant spillages cannot be contained. Stay upwind. Keep out of low areas. Keep people away from and upwind of spill/leak. Ventilate closed spaces before entering. Ensure adequate ventilation. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Use Personal Protective Equipment recommended in Section 8 of the MSDS.

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, sewers, basements or confined areas.

Methods for cleaning up
Should not be released into the environment.
Large Spills: Dike far ahead of liquid 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: Absorb spill with vermiculite or other inert material. Clean contaminated surface thoroughly. Avoid dust formation. After removal flush contaminated area thoroughly with water.
Never return spills in original containers for re-use.

7. Handling and Storage

Handling
Use Personal Protective Equipment recommended in section 8 of the MSDS. Handle and open container with care. Use only with adequate ventilation. Avoid prolonged exposure. Wash thoroughly after handling.

Storage
Keep in a well-ventilated place. Keep container tightly closed. Keep this material away from food, drink and animal feed. Keep out of the reach of children. Use care in handling/storage.

8. Exposure Controls / Personal Protection

ACGIH

<table>
<thead>
<tr>
<th>Components</th>
<th>Type</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acetic acid (64-19-7)</td>
<td>STEL</td>
<td>15 ppm</td>
</tr>
<tr>
<td></td>
<td>TWA</td>
<td>10 ppm</td>
</tr>
</tbody>
</table>
### Components

<table>
<thead>
<tr>
<th>Components</th>
<th>Type</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ammonium fluoride (12125-01-8)</td>
<td>TWA</td>
<td>2,5 mg/m³</td>
</tr>
</tbody>
</table>

#### U.S. - OSHA

<table>
<thead>
<tr>
<th>Components</th>
<th>Type</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acetic acid (64-19-7)</td>
<td>PEL</td>
<td>10 ppm</td>
</tr>
<tr>
<td></td>
<td></td>
<td>25 mg/m³</td>
</tr>
<tr>
<td></td>
<td>TWA</td>
<td>25 mg/m³</td>
</tr>
<tr>
<td>Ammonium fluoride (12125-01-8)</td>
<td>PEL</td>
<td>2,5 mg/m³</td>
</tr>
<tr>
<td></td>
<td>TWA</td>
<td>2,5 mg/m³</td>
</tr>
</tbody>
</table>

### Engineering controls

Use process enclosures, local exhaust ventilation, or other engineering controls to control airborne levels below recommended exposure limits.

### Personal protective equipment

#### Eye / face protection

Do not get this material in contact with eyes. Wear face shield if there is risk of splashes. Provide an emergency eye wash fountain and quick drench shower in the immediate work area. Wear approved safety glasses or goggles.

#### Skin protection

Wear appropriate chemical resistant gloves. Wear appropriate chemical resistant clothing. Protective shoes or boots. Structural firefighters protective clothing provides limited protection in fire situations ONLY; it is not effective in spill situations. Use chemical splash goggles and face shield (ANSI Z87.1 or approved equivalent). Do not get this material in contact with skin. Do not get this material on clothing. Wear chemical protective equipment that is specifically recommended by the Personal Protective Equipment manufacturer.

#### Respiratory protection

Do not breathe dust/fume/gas/mist/vapors/spray. In case of inadequate ventilation or risk of inhalation of vapors, use suitable respiratory equipment.

#### General hygiene considerations

When using, do not eat, drink or smoke. Wash hands before breaks and immediately after handling the product. Remove and isolate contaminated clothing and shoes. Handle in accordance with good industrial hygiene and safety practice. Launder contaminated clothing before reuse.

### 9. Physical & Chemical Properties

#### Appearance

Colorless liquid.

#### Color

Clear.

#### Odor

Vinegar-like.

#### Odor threshold

Not available.

#### Physical state

Liquid.

#### Form

Liquid.

#### pH

Not available.

#### Melting point

32 °F (0 °C)

#### Freezing point

Not available.

#### Boiling point

212 °F (100 °C)

#### Flash point

185 °F (85 °C)

#### Evaporation rate

Not available.

#### Flammability

Not available.

### Flammability limits in air

- **Upper, % by volume**: Not available.
- **Lower, % by volume**: Not available.

#### Flammability limits in air

Not available.

#### Vapor pressure

10.02 mmHg

#### Vapor density

2.1 (air=1)

#### Specific gravity

1.056 (Water=1)

#### Solubility (water)

Completely Soluble
Partition coefficient
(n-octanol/water) Not available.
Auto-ignition temperature Not available.
Decomposition temperature Not available.
VOC Not available
Percent volatile Not available

10. Chemical Stability & Reactivity Information
Chemical stability Stable at normal conditions.
Possibility of hazardous reactions Hazardous polymerization does not occur.

11. Toxicological Information

Toxicological data

Components Test Results
Ammonium fluoride (12125-01-8) Acute Oral LD50 Rat: 50 mg/kg
Propylene glycol (57-55-6) Acute Oral LD50 Dog: 19000 mg/kg
Acute Oral LD50 Guinea pig: 18400 - 99999 mg/kg
Acute Oral LD50 Mouse: 23900 - 31800 mg/kg
Acute Oral LD50 Rabbit: 18000 mg/kg
Acute Oral LD50 Rat: 30000 mg/kg
Acute Other LD50 Mouse: 6630 mg/kg
Acute Other LD50 Mouse: 17.3 g/kg
Acute Other LD50 Rat: 6423 mg/kg
Acute Other LD50 Rat: 14 g/kg
Acetic acid (64-19-7) Acute Dermal LD50 Rabbit: 1060 mg/kg
Acute Inhalation LC50 Guinea pig: 5000 mg/l 1 Hours
Acute Inhalation LC50 Mouse: 5000 mg/l 1 Hours
Acute Oral LD50 Rat: 3530 mg/kg

Acute effects Harmful if inhaled, absorbed through skin, or swallowed. Corrosive to skin and eyes.
Local effects Causes burns.
Sensitization Not available.
Chronic effects Hazardous by OSHA criteria. Prolonged inhalation may be harmful. Prolonged exposure may cause chronic effects.
Carcinogenicity This product is not considered to be a carcinogen by IARC, ACGIH, NTP, or OSHA. No data available.

ACGIH Carcinogens
Ammonium fluoride (CAS 12125-01-8) Group A4 Not classifiable as a human carcinogen.

IARC Monographs. Overall Evaluation of Carcinogenicity
Ammonium fluoride (CAS 12125-01-8) 3 Classification not possible from current data.

Epidemiology Not available.
Mutagenicity No data available.
Neurological effects Not available.
Reproductive effects No data available.
Teratogenicity Not available.
12. Ecological Information

Ecotoxicological data

<table>
<thead>
<tr>
<th>Components</th>
<th>Test Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Propylene glycol (57-55-6)</td>
<td>EC50 Water flea (Daphnia magna): &gt; 10000 mg/l 48 Hours</td>
</tr>
<tr>
<td></td>
<td>LC50 Fathead minnow (Pimephales promelas): 710 mg/l 96 Hours</td>
</tr>
<tr>
<td>Acetic acid (64-19-7)</td>
<td>EC50 Water flea (Daphnia magna): 65 mg/l 48 Hours</td>
</tr>
<tr>
<td></td>
<td>LC50 Bluegill (Lepomis macrochirus): 75 mg/l 96 Hours</td>
</tr>
<tr>
<td></td>
<td>LC50 Fathead minnow (Pimephales promelas): 79 mg/l 96 Hours</td>
</tr>
</tbody>
</table>

Ecotoxicity Components of this product are hazardous to aquatic life.

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

Persistence and degradability Not available.

Bioaccumulation / Accumulation No data available.

Mobility in environmental media No data available.

13. Disposal Considerations

Disposal instructions Dispose of this material and its container at hazardous or special waste collection point. Do not allow this material to drain into sewers/water supplies. Dispose in accordance with all applicable regulations.

Waste from residues / unused products Dispose of in accordance with local regulations.

Contaminated packaging Dispose of in accordance with local regulations.

14. Transport Information

DOT

Basic shipping requirements:

<table>
<thead>
<tr>
<th>UN number</th>
<th>Proper shipping name</th>
<th>Hazard class</th>
<th>Packing group</th>
<th>Additional information</th>
</tr>
</thead>
<tbody>
<tr>
<td>UN3265</td>
<td>Corrosive liquid, acidic, organic, n.o.s. (Acetic acid RQ = , Ammonium fluoride RQ = )</td>
<td>8</td>
<td>III</td>
<td>IB3, T7, TP1, TP28</td>
</tr>
</tbody>
</table>

IATA

Basic shipping requirements:

<table>
<thead>
<tr>
<th>UN number</th>
<th>Proper shipping name</th>
<th>Hazard class</th>
<th>Packing group</th>
</tr>
</thead>
<tbody>
<tr>
<td>3265</td>
<td>Corrosive liquid, acidic, organic, n.o.s. (Acetic acid, Ammonium fluoride)</td>
<td>8</td>
<td>III</td>
</tr>
</tbody>
</table>

IMDG

Basic shipping requirements:

<table>
<thead>
<tr>
<th>UN number</th>
<th>Proper shipping name</th>
<th>Hazard class</th>
<th>Packing group</th>
</tr>
</thead>
<tbody>
<tr>
<td>3265</td>
<td>Corrosive liquid, acidic, organic, n.o.s. (Acetic acid, Ammonium fluoride)</td>
<td>8</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.

CERCLA (Superfund) reportable quantity (lbs)
Acetic acid: 5000
Ammonium fluoride: 100

Superfund Amendments and Reauthorization Act of 1986 (SARA)
Hazard categories
Immediate Hazard - Yes
Delayed Hazard - Yes
Fire Hazard - Yes
Pressure Hazard - No
Reactivity Hazard - No

Section 302 extremely hazardous substance
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
Acetic acid (CAS 64-19-7) Listed.
Ammonium fluoride (CAS 12125-01-8) Listed.
Propylene glycol (CAS 57-55-6) Listed.

16. Other Information

Further information
HMIS® is a registered trade and service mark of the NPCA.
<table>
<thead>
<tr>
<th></th>
<th>HMIS® ratings</th>
<th>NFPA ratings</th>
<th>Disclaimer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health</td>
<td>3*</td>
<td>3</td>
<td>This information is provided without warranty. The information is believed to be correct. This information should be used to make an independent determination of the methods to safeguard workers and the environment.</td>
</tr>
<tr>
<td>Flammability</td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Physical hazard</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Flammability</td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Instability</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Issue date</td>
<td>07-08-2009</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>