1. Product and Company Identification

<table>
<thead>
<tr>
<th>Material name</th>
<th>ALUMINUM ETCH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Version #</td>
<td>02</td>
</tr>
<tr>
<td>Revision date</td>
<td>08-26-2011</td>
</tr>
<tr>
<td>CAS #</td>
<td>Mixture</td>
</tr>
<tr>
<td>Product Codes</td>
<td>J.T.Baker: 5427, 5465</td>
</tr>
<tr>
<td>Synonym(s)</td>
<td>Aluminum Etch 16-1-1-2</td>
</tr>
<tr>
<td>Manufacturer</td>
<td>Avantor Performance Materials, Inc.</td>
</tr>
<tr>
<td>Address</td>
<td>3477 Corporate Parkway Suite #200 Center Valley, PA 18034 US</td>
</tr>
<tr>
<td>Customer Service</td>
<td>855-282-6867</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

Corrosive. Causes severe skin and eye burns. Causes digestive tract burns. Mist or vapor extremely irritating to eyes and respiratory tract.

OSHA regulatory status

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

Potential health effects

- **Routes of exposure**
  - Ingestion
  - Inhalation
  - Skin
  - 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.

- **Inhalation**
  - Corrosive. May cause damage to mucous membranes in nose, throat, lungs and bronchial system.

- **Ingestion**
  - Corrosive. Ingestion may produce burns to the lips, oral cavity, upper airway, esophagus and possibly the digestive tract.

- **Target organs**
  - Eyes. Skin. Lungs. Respiratory system.

- **Chronic effects**
  - Corrosive. Prolonged contact causes serious tissue damage.

- **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

<table>
<thead>
<tr>
<th>Hazardous components</th>
<th>CAS #</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHOSPHORIC ACID</td>
<td>7664-38-2</td>
<td>60 - 80</td>
</tr>
<tr>
<td>ACETIC ACID</td>
<td>64-19-7</td>
<td>1 - 5</td>
</tr>
<tr>
<td>NITRIC ACID</td>
<td>7697-37-2</td>
<td>1 - 5</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Non-hazardous components</th>
<th>CAS #</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>WATER</td>
<td>7732-18-5</td>
<td>15 - 40</td>
</tr>
</tbody>
</table>
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. Treat symptomatically.

**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. No unusual fire or explosion hazards noted.

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

**Unsuitable extinguishing media**
None known.

**Protection of firefighters**

**Specific hazards arising from the chemical**
Fire may produce irritating, corrosive and/or toxic gases.

**Protective equipment and precautions for firefighters**
Use water spray to cool unopened containers. Self-contained breathing apparatus and full protective clothing must be worn in case of fire. 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.

**Hazardous combustion products**
Carbon monoxide and carbon dioxide. Nitrogen Oxides (NOx). Phosphorus Oxides (PxOy).

6. Accidental Release Measures

**Personal precautions**
Keep unnecessary personnel away. Wear appropriate protective equipment and clothing during clean-up. Keep upwind. Keep out of low areas. Ventilate closed spaces before entering them. Local authorities should be advised if significant spillages cannot be contained.

**Environmental precautions**
Prevent further leakage or spillage if safe to do so. Avoid discharge into drains, water courses or onto the ground.

**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

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). Clean surface thoroughly to remove residual contamination.

Never return spills in original containers for re-use. Clean up in accordance with all applicable regulations. Neutralize spill area and washings with soda ash or lime. Collect in a non-combustible container for prompt disposal.

J. T. Baker NEUTRASORB® acid neutralizers are 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 taste or swallow. 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

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>15.0000 ppm</td>
</tr>
<tr>
<td></td>
<td>TWA</td>
<td>10.0000 ppm</td>
</tr>
<tr>
<td>NITRIC ACID (7697-37-2)</td>
<td>STEL</td>
<td>4.0000 ppm</td>
</tr>
<tr>
<td></td>
<td>TWA</td>
<td>2.0000 ppm</td>
</tr>
<tr>
<td>PHOSPHORIC ACID (7664-38-2)</td>
<td>STEL</td>
<td>3.0000 mg/m3</td>
</tr>
<tr>
<td></td>
<td>TWA</td>
<td>1.0000 mg/m3</td>
</tr>
</tbody>
</table>

Occupational exposure limits

<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>25.0000 mg/m3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>10.0000 ppm</td>
</tr>
<tr>
<td>NITRIC ACID (7697-37-2)</td>
<td>PEL</td>
<td>5.0000 mg/m3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2.0000 ppm</td>
</tr>
<tr>
<td>PHOSPHORIC ACID (7664-38-2)</td>
<td>PEL</td>
<td>1.0000 mg/m3</td>
</tr>
</tbody>
</table>

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. Respirator type: Chemical respirator with specific cartridge and full facepiece providing protection against the compound of concern.

General hygene 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

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appearance</td>
<td>Clear.</td>
</tr>
<tr>
<td>Color</td>
<td>Colorless.</td>
</tr>
<tr>
<td>Odor</td>
<td>Not available.</td>
</tr>
<tr>
<td>Odor threshold</td>
<td>Not available.</td>
</tr>
<tr>
<td>Physical state</td>
<td>Liquid.</td>
</tr>
<tr>
<td>Form</td>
<td>Liquid.</td>
</tr>
<tr>
<td>pH</td>
<td>Not available.</td>
</tr>
<tr>
<td>Melting point</td>
<td>Not available.</td>
</tr>
<tr>
<td>Flash point</td>
<td>Not available.</td>
</tr>
<tr>
<td>Evaporation rate</td>
<td>Not available.</td>
</tr>
<tr>
<td>Flammability limits in air, upper, % by volume</td>
<td>Not available.</td>
</tr>
<tr>
<td>Flammability limits in air, lower, % by volume</td>
<td>Not available.</td>
</tr>
<tr>
<td>Vapor density</td>
<td>Not available.</td>
</tr>
<tr>
<td>Relative density</td>
<td>Not available.</td>
</tr>
<tr>
<td>Solubility (water)</td>
<td>Not available.</td>
</tr>
<tr>
<td>Partition coefficient (n-octanol/water)</td>
<td>Not available</td>
</tr>
<tr>
<td>Decomposition temperature</td>
<td>Not available.</td>
</tr>
</tbody>
</table>

10. Chemical Stability & Reactivity Information

- **Chemical stability**: Stable under normal temperature conditions.
- **Conditions to avoid**: Reacts violently with strong alkaline substances. This product may react with reducing agents. This product may react with oxidizing agents. Do not mix with other chemicals. Unsuitable containers: metals.
- **Possibility of hazardous reactions**: Hazardous polymerization does not occur.

11. Toxicological Information

**Toxicological data**

<table>
<thead>
<tr>
<th>Product</th>
<th>Test Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>ALUMINUM ETCH (Mixture)</td>
<td>Acute Dermal LD50 Rabbit: 3365 mg/kg estimated</td>
</tr>
<tr>
<td></td>
<td>Acute Inhalation LC50 Rat: 295 mg/l estimated</td>
</tr>
<tr>
<td></td>
<td>Acute Oral LD50 Rat: 2056 mg/kg estimated</td>
</tr>
</tbody>
</table>

**Components**

<table>
<thead>
<tr>
<th>Component</th>
<th>Test Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACETIC ACID (64-19-7)</td>
<td>Acute Dermal LD50 Rabbit: 1060 mg/kg</td>
</tr>
<tr>
<td></td>
<td>Acute Inhalation LC50 Rat: 11.4 mg/l 4.00 Hours</td>
</tr>
<tr>
<td></td>
<td>Acute Oral LD50 Rat: 3310 mg/kg</td>
</tr>
<tr>
<td>NITRIC ACID (7697-37-2)</td>
<td>Acute Inhalation LC50 Rat: 65 mg/l 4.00 Hours</td>
</tr>
<tr>
<td>PHOSPHORIC ACID (7664-38-2)</td>
<td>Acute Dermal LD50 Rabbit: 2740 mg/kg</td>
</tr>
<tr>
<td></td>
<td>Acute Oral LD50 Rat: 1530 mg/kg</td>
</tr>
</tbody>
</table>
Sensitization
Not a skin sensitizer.

Acute effects
Strongly corrosive. May cause deep tissue damage.

Local effects
Causes severe burns. Mist or vapor extremely irritating to eyes and respiratory tract.

Chronic effects
Corrosive. Prolonged contact causes serious tissue damage.

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

Skin corrosion/irritation
Corrosive to skin and eyes.

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 to indicate product or any components present at greater than 0.1% may cause birth defects.

Symptoms and target organs
Corrosive effects.

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

12. Ecological Information

Ecotoxicological data

<table>
<thead>
<tr>
<th>Product</th>
<th>Test Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>ALUMINUM ETCH (Mixture)</td>
<td>EC50 Daphnia: 8535 mg/l 48.00 hours estimated  LC50 Fish: 3735 mg/l 96.00 hours estimated</td>
</tr>
</tbody>
</table>

Components

<table>
<thead>
<tr>
<th>Component</th>
<th>Test Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACETIC ACID (64-19-7)</td>
<td>EC50 Water flea (Daphnia magna): 65 mg/l 48.00 hours  LC50 Bluegill (Lepomis macrochirus): 75 mg/l 96.00 hours</td>
</tr>
</tbody>
</table>

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

Persistence and degradability
Expected to be readily biodegradable.

Partition coefficient
Not available

13. Disposal Considerations

Waste codes
D002: Waste Corrosive material [pH <=2 or =>12.5, or corrosive to steel]

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:
<table>
<thead>
<tr>
<th>UN number</th>
<th>UN1760</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proper shipping name</td>
<td>Corrosive liquids, n.o.s. (PHOSPHORIC ACID, NITRIC ACID)</td>
</tr>
<tr>
<td>Hazard class</td>
<td>8</td>
</tr>
<tr>
<td>Packing group</td>
<td>II</td>
</tr>
<tr>
<td>Additional information: Special provisions</td>
<td>B2, IB2, T11, TP2, TP27</td>
</tr>
</tbody>
</table>
Basic shipping requirements:
Labels required 8

Additional information:
Packaging exceptions 154
Packaging non bulk 202
Packaging bulk 242
ERG number 154

IATA
Basic shipping requirements:
UN number 1760
Proper shipping name Corrosive liquid, n.o.s. (PHOSPHORIC ACID, NITRIC ACID)
Hazard class 8
Packing group II

IMDG
Basic shipping requirements:
UN number 1760
Proper shipping name CORROSIVE LIQUID, N.O.S. (PHOSPHORIC ACID, NITRIC ACID)
Hazard class 8
Packing group II

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
NITRIC ACID (CAS 7697-37-2) 1000 LBS

US EPCRA (SARA Title III) Section 302 - Extremely Hazardous Substance: Threshold Planning Quantity
NITRIC ACID (CAS 7697-37-2) 1000 LBS

US EPCRA (SARA Title III) Section 313 - Toxic Chemical: De minimis concentration
NITRIC ACID (CAS 7697-37-2) 1.0 %

US EPCRA (SARA Title III) Section 313 - Toxic Chemical: Listed substance
NITRIC ACID (CAS 7697-37-2) Listed.

CERCLA (Superfund) reportable quantity
PHOSPHORIC ACID: 5000.0000
ACETIC ACID: 5000.0000
NITRIC ACID: 1000.0000

Material name: ALUMINUM ETCH
MSDS ID: A2711 Version #: 02 Revision date: 08-26-2011
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
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
NITRIC ACID (CAS 7697-37-2)  500 LBS

US - Pennsylvania RTK - Hazardous Substances: Listed substance
ACETIC ACID (CAS 64-19-7)  Listed.
NITRIC ACID (CAS 7697-37-2)  Listed.
PHOSPHORIC ACID (CAS 7664-38-2)  Listed.

Saf-T-Data
Health: 3 - Severe
Flammability: 0 - None
Reactivity: 1 - Slight
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. Mist or vapor extremely irritating to eyes and respiratory tract.

Label Precautions
Do not breathe mist or vapor. Do not get in eyes, on skin, or on clothing. Use only with adequate ventilation. Keep container closed. 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. Get medical attention 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 ingested the substance.
### NFPA ratings

<table>
<thead>
<tr>
<th>Health</th>
<th>Flammability</th>
<th>Instability</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>

### Disclaimer

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### Issue date

08-26-2011