Material Safety Data Sheet

Section 1: Chemical Product and Company Identification

<table>
<thead>
<tr>
<th>Catalog Number:</th>
<th>677, V-107</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product Identity:</td>
<td>AMMONIUM MOLYBDATE – VANADATE SOLUTION</td>
</tr>
<tr>
<td>Manufacturer's Name:</td>
<td>RICCA CHEMICAL COMPANY LLC</td>
</tr>
<tr>
<td>Emergency Contact(24 hr) -- CHEMTREC®</td>
<td>Domestic: 800-424-9300  International: 703-527-3887</td>
</tr>
<tr>
<td>CAGE Code:</td>
<td>4TCW6, 0V553, 4XZQ2</td>
</tr>
<tr>
<td>Address:</td>
<td>448 West Fork Dr, Arlington, TX 76012</td>
</tr>
<tr>
<td>Telephone Number For Information:</td>
<td>817-461-5601</td>
</tr>
<tr>
<td>Date Prepared:</td>
<td>8/25/99</td>
</tr>
<tr>
<td>Revision:</td>
<td>5</td>
</tr>
<tr>
<td>Last Revised:</td>
<td>10/31/2005</td>
</tr>
<tr>
<td>Date Printed:</td>
<td>07/21/2011 12:08:22 pm</td>
</tr>
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</table>

Section 2: Composition/Information on Ingredients

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS Registry #</th>
<th>Concentration</th>
<th>ACGIH TLV</th>
<th>OSHA PEL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ammonium Molybdate Tetrahydrate</td>
<td>12054-85-2</td>
<td>3 - 5</td>
<td>Not Available</td>
<td>Not Available</td>
</tr>
<tr>
<td>Nitric Acid</td>
<td>7697-37-2</td>
<td>19 - 21</td>
<td>2 ppm</td>
<td>2 ppm</td>
</tr>
<tr>
<td>Water, Deionized</td>
<td>7732-18-5</td>
<td>Balance</td>
<td>Not Available</td>
<td>Not Available</td>
</tr>
<tr>
<td>Ammonium Metavanadate</td>
<td>7803-55-6</td>
<td>0.09 - 0.11</td>
<td>Not Available</td>
<td>Not Available</td>
</tr>
</tbody>
</table>

Section 3: Hazard Identification

Emergency Overview: Corrosive Liquid. May be fatal if swallowed. Avoid contact with skin, eyes, and clothing. Avoid breathing vapor. If swallowed, do not induce vomiting. Dilute with water and call a physician. Wash areas of contact with plenty of water. Potential symptoms of overexposure are irritation of the eyes, mucous membranes and skin, dental erosion, bronchitis, pneumonitis, delayed pulmonary edema.

Target Organs: eyes, skin, respiratory system, teeth.

Eye Contact: May cause irritation, redness, pain, and tearing.

Inhalation: May cause irritation of the nose, throat, and respiratory tract. Prolonged exposure to vapors of Nitric Acid may lead to pneumonia or pulmonary edema.

Skin Contact: May cause irritation, redness and pain. Contact will discolor skin yellow-brown depending on exposure which will wear off after a period of time.

Ingestion: Corrosive. May cause immediate pain and burns of the mouth, throat, esophagus and gastrointestinal tract.
AMMONIUM MOLYDATE – VANADATE SOLUTION

Section 4: First Aid Measures - In all cases, seek qualified evaluation.

Eye Contact: Irrigate immediately with large quantity of water for at least 15 minutes. Call a physician if irritation develops.
Inhalation: Remove to fresh air. Give artificial respiration if necessary. If breathing is difficult, give oxygen.
Skin Contact: Flush with plenty of water for at least 15 minutes. Call a physician if irritation develops.
Ingestion: Do not induce vomiting. Give large quantity of water. Call a physician immediately.

Section 5: Fire Fighting Measures

LFL: Not Available. UFL: Not Available.
Extinguishing Media: Use any means suitable for extinguishing surrounding fire.
Fire & Explosion Hazards: Not combustible, but substance is an oxidizer and its heat of reaction with reducing agents or combustibles may cause ignition. Can react with metals to release flammable hydrogen gas. May react explosively with combustible organic or readily oxidizable materials such as: alcohols, turpentine, charcoal, organic refuse, metal powder, hydrogen sulfide, etc.
Fire Fighting Instructions: Use normal procedures/instructions.
Fire Fighting Equipment: Use protective clothing and breathing equipment appropriate for the surrounding fire.

Section 6: Accidental Release Measures

Cover the spill with Sodium Carbonate or a soda ash-slaked lime mixture (50:50). Mix and add water to form slurry. Decant the liquid to the drain with excess water. Treat the solid residue as normal refuse. Wash site with soda ash solution. Always dispose of in accordance with local regulations.

Section 7: Handling and Storage

As with all chemicals, wash hands thoroughly after handling. Avoid contact with eyes and skin. Protect from freezing and physical damage. Keep out of direct sunlight and away from heat, water, and incompatible materials.
Safety Storage Code: Corrosive

Section 8: Exposure Control/Personal Protection

Engineering Controls: A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limit.
Respiratory Protection: A system of local or general exhaust is recommended to keep exposure levels below the Airborne Exposure Limits.
Skin Protection: Chemical resistant gloves.
Eye Protection: Safety glasses or goggles.

Section 9: Physical and Chemical Properties

Appearance: Clear, pale yellow liquid
Odor: Slightly pungent to pungent
Solubility in Water: Infinite
Specific Gravity: Approximately 1.1
pH: Not Available.
Boiling Point(°C): Approximately 101
Melting Point(°C): Approximately 0
Vapor Pressure: Not Applicable.

Section 10: Stability and Reactivity

Chemical Stability: Stable under normal conditions of use and storage.
Incompatibility: Strong bases, metallic powders, Carbides, Hydrogen Sulfide, Turpentine and combustible organics.

Hazardous Decomposition Products: Emits highly toxic fumes of Ammonia, Nitrogen Oxides and Hydrogen Nitrate when heated to decomposition.

Hazardous Polymerization: Will not occur.

Section 11. Toxicological Information
LDLo, Oral, Human: 430 mg/kg (Nitric Acid), details of toxic effects not reported other than lethal dose value.
LDLo, Oral, Rat: 58100 ug/kg (Ammonium meta-Vanadate), behavioral and gastrointestinal effects noted.

Section 12. Ecological Information
Ecotoxicological Information: No information found.
Chemical Fate Information: No information found.

Section 13. Disposal Considerations
Neutralize with Soda Ash or Calcium Carbonate. Wash resulting solution down the drain. Treat the solid residue as normal refuse. Always dispose of in accordance with local, state and federal regulations.

Section 14. Transport Information
Part Numbers: 677-16, 677-32, V-107 LT
D.O.T. Shipping Name: Nitric Acid Solution, (other than red fuming, with not more than 20% nitric acid)
D.O.T. Hazard Class: 8
U.N. / N.A. Number: UN2031
Packing Group: II
D.O.T. Label: 8

Section 15. Regulatory Information (Not meant to be all inclusive - selected regulation represented)
TSCA Status: All components of this solution are listed on the TSCA Inventory or are mixtures (hydrates) of items listed on the TSCA Inventory.
Sara Title III:
Section 302 Extremely Hazardous Substances: Not Applicable.
Section 311/312 Hazardous Catagories: Acute, Chronic: Yes Fire, Pressure, Reactivity: No
Section 313 Toxic Chemicals: Not Applicable.
California: None Reported.
Pennsylvania: Ammonium Metavanadate is listed as an Environmental Hazard on the state’s Hazardous Substances List. Nitric Acid is listed as an Environmental Hazard on the state’s Hazardous Substances List. Nitric Acid is listed as an Environmental Hazard on the state’s Hazardous Substances List. Ammonium Metavanadate is listed as an Environmental Hazard on the state’s Hazardous Substances List.
RCRA Status: P119,P119
CERCLA Reportable Quantity: Ammonium Metavanadate - 1000 pounds. Nitric Acid - 1,000 pounds. Nitric Acid - 1,000 pounds. Ammonium Metavanadate - 1000 pounds.

WHMIS: E: Corrosive Material.

Section 16. Other Information
When handled properly by qualified personnel, the product described herein does not present a significant health or safety hazard. Alteration of its characteristics by concentration, evaporation, addition of other substances, or other means may present hazards not specifically addressed herein and which must be evaluated by the user. The information furnished herein is believed to be accurate and represents the best data currently available to us. No warranty, expressed or implied, is made and RICCA CHEMICAL COMPANY assumes no legal responsibility or liability whatsoever resulting from its use.