Material Safety Data Sheet

Section 1. Chemical Product and Company Identification

Common Name/Trade Name
Ammonium molybdate tetrahydrate

Catalog Number(s).
AM182, A1210, A1675

CAS#
12054-85-2

Manufacturer
SPECTRUM LABORATORY PRODUCTS INC.
14422 S. SAN PEDRO STREET
GARDENA, CA 90248

TSCA
TSCA 8(b) inventory: No products were found. Not listed on the TSCA Inventory 8(b) since it is a hydrate. However, the anhydrous form (CAS no. 12027-67-7) is listed on the TSCA 8(b) inventory.

CI# Not available.

Section 2. Composition and Information on Ingredients

<table>
<thead>
<tr>
<th>Name</th>
<th>CAS #</th>
<th>TWA (mg/m³)</th>
<th>STEL (mg/m³)</th>
<th>CEIL (mg/m³)</th>
<th>% by Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Ammonium molybdate tetrahydrate</td>
<td>12054-85-2</td>
<td>5</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

Toxicological Data on Ingredients
Ammonium molybdate anhydrous (CAS no. 12027-67-7):
ORAL (LD50): Acute: 333 mg/kg [Rat].

Section 3. Hazards Identification

Potential Acute Health Effects
Hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion, of inhalation.

Potential Chronic Health Effects
CARCINOGENIC EFFECTS: Not available.
MUTAGENIC EFFECTS: Not available.
TERATOGENIC EFFECTS: Not available.
DEVELOPMENTAL TOXICITY: Not available.
Repeated or prolonged exposure is not known to aggravate medical condition.

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### Section 4. First Aid Measures

| Eye Contact | Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Cold water may be used. Get medical attention. |
| Skin Contact | In case of contact, immediately flush skin with plenty of water. Cover the irritated skin with an emollient. Remove contaminated clothing and shoes. Cold water may be used. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention. |
| Serious Skin Contact | Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek immediate medical attention. |
| Inhalation | If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention. |
| Serious Inhalation | Not available. |
| Ingestion | Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If large quantities of this material are swallowed, call a physician immediately. Loosen tight clothing such as a collar, tie, belt or waistband. |
| Serious Ingestion | Not available. |

### Section 5. Fire and Explosion Data

| Flammability of the Product | Non-flammable. |
| Auto-Ignition Temperature | Not applicable. |
| Flash Points | Not applicable. |
| Flammable Limits | Not applicable. |
| Products of Combustion | Not available. |
| Fire Hazards in Presence of Various Substances | Not applicable. |
| Fire Fighting Media and Instructions | Not applicable. |
| Special Remarks on Fire Hazards | Not available. |
| Special Remarks on Explosion Hazards | Not available. |

### Section 6. Accidental Release Measures

| Small Spill | Use appropriate tools to put the spilled solid in a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and dispose of according to local and regional authority requirements. |
| Large Spill | Use a shovel to put the material into a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and allow to evacuate through the sanitary system. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities. |

Continued on Next Page
Section 7. Handling and Storage

Precautions

Do not ingest. Do not breathe dust. Wear suitable protective clothing. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes. Keep away from incompatibles such as acids.

Storage

Keep container tightly closed. Keep container in a cool, well-ventilated area.

Section 8. Exposure Controls/Personal Protection

Engineering Controls

Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

Personal Protection

Splash goggles. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill

Splash goggles. Full suit. Dust respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits

TWA: 5 (mg(Mo)/m³) from OSHA (PEL) [United States]
TWA: 0.5 (mg(Mo)/m³) from ACGIH (TLV) [United States] Inhalation Respirable.
TWA: 5 (mg(Mo)/m³) from ACGIH (TLV) [United States]
TWA: 5 STEL: 10 (mg(Mo)/m³) [United Kingdom (UK)]
TWA: 5 (mg(Mo)/m³) [Belgium]
TWA: 5 (mg(Mo)/m³) [Denmark]
TWA: 5 (mg(Mo)/m³) [Austria]
TWA: 5 (mg(Mo)/m³) [Switzerland]
TWA: 5 (mg(Mo)/m³) [Switzerland]

Consult local authorities for acceptable exposure limits.

Section 9. Physical and Chemical Properties

Physical state and appearance

Solid. (Crystals solid. Crystalline powder.)

Molecular Weight

1235.86 g/mole

pH (1% soln/water)

Not available.

Odor

Ammoniacal. (Slight.)

Taste

Not available.

Color

White or colorless to slightly greenish or yellowish.

Boiling Point

Decomposition temperature: 190°C (374°F)

Melting Point

90°C (194°F)

Critical Temperature

Not available.

Specific Gravity

2.276 (Water = 1)

Vapor Pressure

Not applicable.

Vapor Density

Not available.

Volatility

Not available.

Odor Threshold

Not available.

Water/Oil Dist. Coeff.

Not available.

Ionicity (in Water)

Not available.

Dispersion Properties

See solubility in water.

Solubility

Soluble in cold water
Solubility in Water: 43 g/100 cc cold water; 63.5 g/100 cc @ 25 deg. C Practically insoluble in alcohol.
Soluble in acids and alkalis.
Section 10. Stability and Reactivity Data

<table>
<thead>
<tr>
<th>Stability</th>
<th>The product is stable.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Instability Temperature</td>
<td>Not available.</td>
</tr>
<tr>
<td>Conditions of Instability</td>
<td>Excess heat, incompatible materials</td>
</tr>
<tr>
<td>Incompatibility with various substances</td>
<td>Reactive with acids.</td>
</tr>
<tr>
<td>Corrosivity</td>
<td>Non-corrosive in presence of glass.</td>
</tr>
</tbody>
</table>

Special Remarks on Reactivity
- Loses H2O at 90 deg. C.
- Incompatible with alkali metals; sodium, potassium, molten magnesium.

Special Remarks on Corrosivity
- Not available.

Polymerization
- Will not occur.

Section 11. Toxicological Information

Routes of Entry
- Inhalation. Ingestion.

Toxicity to Animals
- Ammonium Molybdate, anhydrous:
  - Acute oral toxicity (LD50): 333 mg/kg [Rat].

Chronic Effects on Humans
- Not available.

Other Toxic Effects on Humans
- Hazardous in case of skin contact (irritant), of ingestion, of inhalation.

Special Remarks on Toxicity to Animals
- Lowest Published Lethal Dose:
  - LDL [Rabbit] - Route: Oral; Dose: 1870 mg/kg
  - LDL [Guinea Pig] - Route: Oral; Dose: 2200 mg/kg
  - LDL [Cat] - Route: Oral; Dose: 1600 mg/kg

Special Remarks on Chronic Effects on Humans
- May affect genetic material (mutagenic).
- No information has been found regarding the carcinogenicity of Ammonium Molybdate. However, the American Conference of Governmental and Industrial Hygienists have given Molybdenum, soluble compounds, as Mo a classification of A3 (confirmed animal carcinogen with unknown relevance to humans).

Special Remarks on other Toxic Effects on Humans
- Acute Potential Health Effects:
  - Skin: Causes skin irritation.
  - Eyes: Causes eye irritation.
  - Inhalation: Causes upper respiratory tract (nose, throat) irritation causing coughing and wheezing. May affect the blood (changes in red and white blood cell counts, anemia)
  - Ingestion: Large doses may cause colic, gout, diarrhea, listlessness, trembling, headache, weakness, fatigue, incoordinated movements, dyspnea, anorexia, loss of weight, joint and muscle pain. Molybdenum ingestion is associated with depleted copper stores in the body.
- Chronic Potential Health Effects:
- Ingestion and Inhalation: Prolonged or repeated ingestion or inhalation of Molybdenum compounds may affect the blood and cause anemia. Anemia is a characteristic feature of Molybdenum toxicity. Prolonged or repeated ingestion of Molybdenum may also deplete copper stores in the body (liver), and cause symptoms similar to that of acute ingestion. Prolonged or repeated ingestion of Molybdenum and Molybdenum compounds may also affect the liver, kidneys, spleen and may cause abnormal bone growth.
- Medical Conditions Aggravated by Exposure: People who have an inadequate intake of dietary intake of copper, or some dysfunction in their copper metabolism could be at greater risk for Molybdenum toxicity.

Section 12. Ecological Information

Ecotoxicity
- Not available.

BOD5 and COD
- Not available.

Products of Biodegradation
- Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation
- The products of degradation are less toxic than the product itself.
Section 13. Disposal Considerations

Waste Disposal

Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14. Transport Information

DOT Classification

Not a DOT controlled material (United States).

Identification

Not applicable.

Special Provisions for Transport

Not applicable.

DOT (Pictograms)

Section 15. Other Regulatory Information and Pictograms

Federal and State Regulations

Minnesota: Listed as Molybdenum, as Mo, Soluble/Insoluble Compounds. TSCA Inventory 8(b): No products found. Ammonium Molybdate, tetrahydrate is not on the TSCA inventory list because it is a hydrate.

California Proposition 65 Warnings


Other Regulations

Other Classifications

WHMIS (Canada) Not controlled under WHMIS (Canada).

DSCL (EEC) R22- Harmful if swallowed. R36/37/38- Irritating to eyes, respiratory system and skin. S22- Do not breathe dust. S26- In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. S37- Wear suitable gloves.

HMIS (U.S.A.)

Health Hazard 2
Fire Hazard 0
Reactivity 0
Personal Protection E

National Fire Protection Association (U.S.A.)

Health 2 0
Flammability 0
Reactivity 0
Specific hazard

Korea: Not listed on National Inventory (KECI).

Other Classifications

WHMIS (Canada) (Pictograms)

Continued on Next Page
### Protective Equipment
- Gloves.
- Lab coat.
- Dust respirator. Be sure to use an approved/certified respirator or equivalent.
- Splash goggles.

### Section 16. Other Information

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<thead>
<tr>
<th>MSDS Code</th>
<th>A5160</th>
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</table>

**References**
Not available.

**Other Special Considerations**
Major Uses: Analytical reagent; in pigments; in photography; for decorating ceramics; for detecting and determining phosphates, arsenates, lead; a catalyst for dehydrogenation and desulfurization in petroleum and coal technology; production of molydenum metal; in fertilizers.

**Validated by Sonia Owen on 12/2/2013.**

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<tr>
<th>CALL (310) 516-8000</th>
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</table>

**Notice to Reader**
All chemicals may pose unknown hazards and should be used with caution. This Material Safety Data Sheet (MSDS) applies only to the material as packaged. If this product is combined with other materials, deteriorates, or becomes contaminated, it may pose hazards not mentioned in this MSDS. It shall be the user's responsibility to develop proper methods of handling and personal protection based on the actual conditions of use. While this MSDS is based on technical data judged to be reliable, Spectrum Quality Products, Inc. assumes no responsibility for the completeness or accuracy of the information contained herein.