1. IDENTIFICATION

Product identifier
Product Name
Reagent for Phosphax sc Analyzer

Other means of identification
Product Code(s)
2825254
Safety data sheet number
M02018
UN/ID no
UN3264

Synonyms

Recommended use of the chemical and restrictions on use
Recommended Use
Analytical reagent.
Uses advised against
None.
Restrictions on use
None.

Details of the supplier of the safety data sheet

Manufacturer Address
Hach Company
P.O.Box 389 Loveland, CO 80539 USA
(970) 669-3050

Emergency telephone number
(303) 623-5716 - 24 Hour Service (515)232-2533 - 8am - 4pm CST

2. HAZARDS IDENTIFICATION

Classification

Regulatory Status
This chemical is considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200)

<table>
<thead>
<tr>
<th>Hazard</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corrosive to metals</td>
<td>1</td>
</tr>
<tr>
<td>Skin corrosion/irritation</td>
<td>1</td>
</tr>
<tr>
<td>Serious eye damage/eye irritation</td>
<td>1</td>
</tr>
<tr>
<td>Specific target organ toxicity (single exposure)</td>
<td>2</td>
</tr>
</tbody>
</table>

Hazards not otherwise classified (HNOC)
Not applicable

Label elements

Signal word - Danger
Hazard statements
H290 - May be corrosive to metals
H314 - Causes severe skin burns and eye damage
H371 - May cause damage to organs

Precautionary statements
P260 - Do not breathe dust/fume/gas/mist/vapors/spray
P264 - Wash face, hands and any exposed skin thoroughly after handling
P280 - Wear protective gloves/protective clothing/eye protection/face protection
P270 - Do not eat, drink or smoke when using this product
P234 - Keep only in original container
P304 + P340 - IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing
P305 + P351 + P338 - IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
P303 + P361 + P353 - IF ON SKIN (or hair): Remove/ Take off immediately all contaminated clothing. Rinse skin with water/shower
P363 - Wash contaminated clothing before reuse
P301 + P330 + P311 - IF SWALLOWED: Rinse mouth. Do NOT induce vomiting
P310 - Immediately call a POISON CENTER or doctor/physician
P390 - Absorb spillage to prevent material damage
P405 - Store locked up
P406 - Store in corrosive resistant stainless steel container with a resistant inner
P501 - Dispose of contents/container to an approved waste disposal plant

Other Information
Harmful to aquatic life

3. COMPOSITION/INFORMATION ON INGREDIENTS

Substance
Not applicable

Mixture

Synonyms
Percent ranges are used where confidential product information is applicable.

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>CAS No</th>
<th>Percent Range</th>
<th>HMRC #</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sulfuric acid</td>
<td>7664-93-9</td>
<td>30 - 40%</td>
<td>-</td>
</tr>
<tr>
<td>Molybdate (Mo7O24S-) hexaammonium</td>
<td>12027-67-7</td>
<td>1 - 5%</td>
<td>-</td>
</tr>
<tr>
<td>Ammonium vanadate</td>
<td>7803-55-6</td>
<td>0.1 - 1%</td>
<td>-</td>
</tr>
</tbody>
</table>
4. FIRST AID MEASURES

**Description of first aid measures**

**General advice**
See section 8 for PPE that may be required during handling. Do not breathe dust/fume/gas/mist/vapors/spray. Do not get in eyes, on skin, or on clothing. In case of accident or unwellness, seek medical advice immediately (show directions for use or safety data sheet if possible). If no local exhaust use approved fume hood and/or respirator. If experiencing respiratory symptoms: Call a POISON CENTER or doctor/physician. Remove from exposure, lie down. Immediate medical attention is required. IF IN EYES: Flush eyes for at least 15 minutes. IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower.

**Eye contact**
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Call a physician immediately.

**Skin contact**
IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower. Call a physician immediately.

**Inhalation**
IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a physician immediately.

**Ingestion**
IF SWALLOWED: Rinse Mouth. Do NOT induce vomiting. Call a physician immediately.

**Self-protection of the first aider**
First aider: Pay attention to self-protection. Use personal protective equipment as required. Avoid contact with skin, eyes or clothing. Ensure that medical personnel are aware of the material(s) involved, take precautions to protect themselves and prevent spread of contamination. Do not use mouth-to-mouth method if victim ingested or inhaled the substance; give artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device.

**Most important symptoms and effects, both acute and delayed**

**Symptoms**
See Section 11: TOXICOLOGICAL INFORMATION.

**Indication of any immediate medical attention and special treatment needed**

**Note to physicians**
Treat symptomatically.

5. FIRE-FIGHTING MEASURES

**Suitable Extinguishing Media**
Dry chemical.

**Unsuitable extinguishing media**
Do NOT use water.

**Flammable properties**
During a fire, irritating and highly toxic gases may be generated by thermal decomposition.

**Specific hazards arising from the chemical**
The product causes burns of eyes, skin and mucous membranes. Thermal decomposition can lead to release of irritating and toxic gases and vapors. In the event of fire and/or explosion do not breathe fumes.

**Hazardous combustion products**

**Protective equipment and precautions for firefighters**
As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

6. ACCIDENTAL RELEASE MEASURES
Only persons properly qualified to respond to an emergency involving hazardous substances may respond to a spill according to federal regulations (OSHA 29 CFR 1910.120(a)(v)) and per your company’s emergency response plan and guidelines/procedures. See Section 13, Special Instructions for disposal assistance. Outside of the US, only persons properly qualified according to state or local regulations should respond to a spill involving chemicals.

EC Notice

Only persons properly qualified to respond to an emergency involving hazardous substances should respond to a spill involving chemicals. See Section 13, Special Instructions for disposal assistance.

WHMIS Notice

Only persons properly qualified to respond to an emergency involving hazardous substances should respond to a spill involving chemicals. See Section 13, Special Instructions for disposal assistance.

Personal precautions, protective equipment and emergency procedures

Personal precautions

Evacuate personnel to safe areas. Do not touch or walk through spilled material. Ventilate affected area. Use personal protective equipment as required.

For emergency responders

Use personal protection recommended in Section 8.

Environmental precautions

See Section 12 for additional ecological information.

Methods and material for containment and cleaning up

Methods for containment

Prevent further leakage or spillage if safe to do so. Dike far ahead of liquid spill for later disposal.

Methods for cleaning up

Take necessary precautions in observance of pertinent physical hazards. Neutralize spill if necessary. Soak up with inert absorbent material. Take up mechanically, placing in appropriate containers for disposal. Clean contaminated surface thoroughly. Dispose of in accordance with local, state and federal regulations or laws.

Emergency Response Guide Number

154

7. HANDLING AND STORAGE

Precautions for safe handling

Advice on safe handling

Absorb spillage to prevent material damage.

Conditions for safe storage, including any incompatibilities

Storage Conditions

Keep out of the reach of children. Keep containers tightly closed in a dry, cool and well-ventilated place. Keep in properly labeled containers. Keep/store only in original container.

Flammability class

Not applicable

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Control parameters

Exposure Guidelines

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>ACGIH TLV</th>
<th>OSHA PEL</th>
<th>NIOSH IDLH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sulfuric acid</td>
<td>TWA: 0.2 mg/m³</td>
<td>TWA: 1 mg/m³</td>
<td>IDLH: 15 mg/m³</td>
</tr>
<tr>
<td>Chemical Name</td>
<td>Alberta OEL</td>
<td>British Columbia OEL</td>
<td>Manitoba OEL</td>
</tr>
<tr>
<td>---------------</td>
<td>-------------</td>
<td>----------------------</td>
<td>--------------</td>
</tr>
<tr>
<td>Sulfuric acid</td>
<td>TWA: 1 mg/m³</td>
<td>TWA: 0.2 mg/m³</td>
<td>TWA: 0.2 mg/m³</td>
</tr>
<tr>
<td>30 - 40%</td>
<td>STEL: 3 mg/m³</td>
<td>STEL: 3 mg/m³</td>
<td>STEL: 0.6 mg/m³</td>
</tr>
<tr>
<td>Molybdate (Mo7O246-), hexaammonium</td>
<td>TWA: 0.5 mg/m³</td>
<td>TWA: 0.5 mg/m³</td>
<td>TWA: 0.5 mg/m³</td>
</tr>
<tr>
<td>1 - 5%</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Other Information
Vacated limits revoked by the Court of Appeals decision in AFL-CIO v. OSHA, 965 F.2d 962 (11th Cir., 1992).

Legend
See section 16 for terms and abbreviations

Appropriate engineering controls
If no local exhaust use approved fume hood or self-contained breathing apparatus
If no local exhaust use approved fume hood and/or respirator
Showers
Eyewash stations

Individual protection measures, such as personal protective equipment

Eye/face protection
Wear tight sealing safety goggles and/or face protection shield. Avoid contact with eyes.

Skin and body protection
Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact.

Respiratory protection
Do not breathe gas/fumes/vapor/spray. If no local exhaust use approved fume hood and/or respirator. In case of inadequate ventilation wear respiratory protection.

General Hygiene Considerations
Avoid breathing (dust, vapor, mist, gas). Avoid contact with skin, eyes or clothing. Use personal protective equipment as required. Wear suitable gloves and eye/face protection. Wash face, hands and any exposed skin thoroughly after handling. Do not eat, drink or smoke when using this product. Keep away from food, drink and animal feeding stuffs. Regular cleaning of equipment, work area and clothing is recommended. Handle in accordance with good industrial hygiene and safety practice. Avoid prolonged or repeated contact with skin. Take off all contaminated clothing and wash it before reuse.

Environmental exposure controls
Do not allow into any sewer, on the ground or into any body of water. Local authorities should be advised if significant spillages cannot be contained.

9. PHYSICAL AND CHEMICAL PROPERTIES

Information on basic physical and chemical properties

<table>
<thead>
<tr>
<th>Physical state</th>
<th>Liquid</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gas Under Pressure</td>
<td>Not classified according to GHS criteria</td>
</tr>
<tr>
<td>Appearance</td>
<td>aqueous solution clear</td>
</tr>
<tr>
<td>Color</td>
<td>yellow</td>
</tr>
<tr>
<td>Odor</td>
<td>None</td>
</tr>
<tr>
<td>Odor threshold</td>
<td>No data available</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Property</th>
<th>Values</th>
<th>Remarks • Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Molecular weight</td>
<td>No data available</td>
<td></td>
</tr>
<tr>
<td>pH</td>
<td>&lt; 1</td>
<td></td>
</tr>
<tr>
<td>Melting point/freezing point</td>
<td>~ -38 °C / -36 °F</td>
<td>Estimation based on theoretical calculation</td>
</tr>
<tr>
<td>Boiling point / boiling range</td>
<td>~ 111 °C / 232 °F</td>
<td>Estimation based on theoretical calculation</td>
</tr>
<tr>
<td>Evaporation rate</td>
<td>1.15 (water = 1)</td>
<td>Estimation based on theoretical calculation</td>
</tr>
<tr>
<td>Vapor pressure</td>
<td>21.902 mm Hg / 2.92 kPa at 25 °C / 77 °F</td>
<td>Estimation based on theoretical calculation</td>
</tr>
<tr>
<td>Vapor density (air = 1)</td>
<td>0.03 (air = 1)</td>
<td></td>
</tr>
<tr>
<td>Specific gravity (water = 1 / air = 1)</td>
<td>1.19</td>
<td></td>
</tr>
<tr>
<td>Partition Coefficient (n-octanol/water)</td>
<td>Not applicable</td>
<td></td>
</tr>
<tr>
<td>Soil Organic Carbon-Water Partition Coefficient</td>
<td>Not applicable</td>
<td></td>
</tr>
<tr>
<td>Autoignition temperature</td>
<td>No data available</td>
<td></td>
</tr>
<tr>
<td>Decomposition temperature</td>
<td>No data available</td>
<td></td>
</tr>
<tr>
<td>Dynamic viscosity</td>
<td>No data available</td>
<td></td>
</tr>
<tr>
<td>Kinematic viscosity</td>
<td>No data available</td>
<td></td>
</tr>
</tbody>
</table>

Solubility(ies)

Water solubility

<table>
<thead>
<tr>
<th>Water solubility classification</th>
<th>Water solubility</th>
<th>Water Solubility Temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soluble</td>
<td>&gt; 1000 mg/L</td>
<td>25 °C / 77 °F</td>
</tr>
</tbody>
</table>

Solubility in other solvents
Product Name: Reagent for Phosphax sc Analyzer  
Revision Date: 15-Dec-2016  
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<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>Solubility classification</th>
<th>Solubility</th>
<th>Solubility Temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acid</td>
<td>Soluble</td>
<td>&gt; 1000 mg/L</td>
<td>25°C / 77°F</td>
</tr>
</tbody>
</table>

Other Information:

Metal Corrosivity
- Classified as corrosive to metal according to GHS criteria
- Category 1, H290
- No data available

GHS Metal Corrosivity Classification
- No data available

Steel Corrosion Rate
- No data available

Aluminum Corrosion Rate
- Not applicable

Bulk density
- Not classified according to GHS criteria.

Explosive properties
- During a fire, corrosive and toxic gases may be generated by thermal decomposition. Not Flammable, but reacts with most metals to form flammable hydrogen gas.
- No data available

Explosion data
- No data available

Flammability Limit in Air
- During a fire, irritating and highly toxic gases may be generated by thermal decomposition.
- No data available

Flammable properties
- No data available

Flash point
- No data available

Method
- No information available

Oxidizing properties
- Not classified according to GHS criteria.

Reactivity properties
- Not classified as self-reactive, pyrophoric, self-heating or emitting flammable gases in contact with water according to GHS criteria.

10. STABILITY AND REACTIVITY

Reactivity properties
- Not classified as self-reactive, pyrophoric, self-heating or emitting flammable gases in contact with water according to GHS criteria

Chemical stability
- Stable under recommended storage conditions.

Special dangers of the product
- None reported

Possibility of Hazardous Reactions
- None under normal processing.

Hazardous polymerization
- Hazardous polymerization does not occur.
Conditions to avoid
Extremes of temperature and direct sunlight. Incompatible materials.

Incompatible materials

Hazardous Decomposition Products
Thermal decomposition can lead to release of irritating and toxic gases and vapors.

Explosive properties
Not classified according to GHS criteria. During a fire, corrosive and toxic gases may be generated by thermal decomposition. Not flammable, but reacts with most metals to form flammable hydrogen gas.

<table>
<thead>
<tr>
<th>Upper explosion limit</th>
<th>No data available</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lower explosion limit</td>
<td>No data available</td>
</tr>
</tbody>
</table>

Autoignition temperature
No data available

Sensitivity to Static Discharge
No

Sensitivity to Mechanical Impact
No

11. TOXICOLOGICAL INFORMATION

NIOSH (RTECS) Number
None reported

Information on Likely Routes of Exposure

<table>
<thead>
<tr>
<th>Product Information</th>
<th>Corrosive to skin. Corrosive to eyes.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inhalation</td>
<td>Causes burns. Corrosive by inhalation.</td>
</tr>
<tr>
<td>Eye contact</td>
<td>Corrosive to the eyes and may cause severe damage including blindness. Causes burns. Corrosive to eyes.</td>
</tr>
<tr>
<td>Skin contact</td>
<td>Cause severe skin burns and eye damage. Causes burns.</td>
</tr>
<tr>
<td>Ingestion</td>
<td>Ingestion causes burns of the upper digestive and respiratory tracts. Causes burns.</td>
</tr>
</tbody>
</table>

Aggravated Medical Conditions
Eye disorders. Skin disorders. Respiratory disorders.

Toxicologically synergistic products
None known.

Toxicokinetics, metabolism and distribution
See ingredients information below.

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>Toxicokinetics, metabolism and distribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sulfuric acid (30 - 40%)</td>
<td>The corrosivity of sulfuric acid makes it difficult to assess its effects on metabolism. Its corrosivity is also the main contributor to acute deaths, therefore it is not classified for acute toxicity.</td>
</tr>
</tbody>
</table>

Product Acute Toxicity Data

Oral Exposure Route
No data available

Dermal Exposure Route
No data available

Inhalation (Dust/Mist) Exposure Route
No data available
Inhalation (Vapor) Exposure Route

No data available

Inhalation (Gas) Exposure Route

No data available

The following values are calculated based on chapter 3.1 of the GHS document

<table>
<thead>
<tr>
<th>Ingredient Acute Toxicity Data</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ATEmix (oral)</strong></td>
</tr>
<tr>
<td><strong>ATEmix (inhalation-dust/mist)</strong></td>
</tr>
</tbody>
</table>

### Oral Exposure Route

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>Endpoint type</th>
<th>Reported dose</th>
<th>Exposure time</th>
<th>Toxicological effects</th>
<th>Key literature references and sources for data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Molybdate (Mo70246-), hexaammonium (1 - 5%) CAS#: 12027-67-7</td>
<td>Rat LD50</td>
<td>333 mg/kg</td>
<td>None reported</td>
<td>None reported</td>
<td>Vendor SDS</td>
</tr>
<tr>
<td>Ammonium vanadate (0.1 - 1%) CAS#: 7803-55-6</td>
<td>Rat LD50</td>
<td>58.1 mg/kg</td>
<td>None reported</td>
<td>None reported</td>
<td>ChemADVISOR</td>
</tr>
</tbody>
</table>

### Dermal Exposure Route

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>Endpoint type</th>
<th>Reported dose</th>
<th>Exposure time</th>
<th>Toxicological effects</th>
<th>Key literature references and sources for data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ammonium vanadate (0.1 - 1%) CAS#: 7803-55-6</td>
<td>Rat LD50</td>
<td>2102 mg/kg</td>
<td>None reported</td>
<td>None reported</td>
<td>ChemADVISOR</td>
</tr>
</tbody>
</table>

### Inhalation (Dust/Mist) Exposure Route

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>Endpoint type</th>
<th>Reported dose</th>
<th>Exposure time</th>
<th>Toxicological effects</th>
<th>Key literature references and sources for data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ammonium vanadate (0.1 - 1%) CAS#: 7803-55-6</td>
<td>Rat LC50</td>
<td>0.0078 mg/L</td>
<td>4 hours</td>
<td>None reported</td>
<td>ChemADVISOR</td>
</tr>
</tbody>
</table>

### Inhalation (Vapor) Exposure Route

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>Endpoint type</th>
<th>Reported dose</th>
<th>Exposure time</th>
<th>Toxicological effects</th>
<th>Key literature references and sources for data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sulfuric acid (30 - 40%) CAS#: 7664-93-9</td>
<td>Rat LC50</td>
<td>0.510 mg/L</td>
<td>None reported</td>
<td>None reported</td>
<td>LOLI</td>
</tr>
<tr>
<td>Chemical Name</td>
<td>Endpoint type</td>
<td>Reported dose</td>
<td>Exposure time</td>
<td>Toxicological effects</td>
<td>Key literature references and sources for data</td>
</tr>
<tr>
<td>---------------</td>
<td>---------------</td>
<td>---------------</td>
<td>---------------</td>
<td>-----------------------</td>
<td>-----------------------------------------------</td>
</tr>
<tr>
<td>Sulfuric acid (30 - 40%) CAS#: 7664-93-9</td>
<td>Human TD50</td>
<td>0.144 mg/L</td>
<td>5 minutes</td>
<td>Lungs, Thorax, or Respiration Dyspnea</td>
<td>RTECS (Registry of Toxic Effects of Chemical Substances)</td>
</tr>
</tbody>
</table>

Inhalation (Gas) Exposure Route

No data available
Product Code(s) 2825254
Issue Date 20-May-2016
Version 4

Product Name Reagent for Phosphax sc Analyzer
Revision Date 15-Dec-2016
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Product Skin Corrosion/Irritation Data
No data available.

Ingredient Skin Corrosion/Irritation Data

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>Test method</th>
<th>Species</th>
<th>Reported dose</th>
<th>Exposure time</th>
<th>Results</th>
<th>Key literature references and sources for data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sulfuric acid (30 - 40%) CAS#: 7664-93-9</td>
<td>Existing human experience</td>
<td>Human</td>
<td>None reported</td>
<td>None reported</td>
<td>Corrosive to skin</td>
<td>HSDB (Hazardous Substances Data Bank)</td>
</tr>
</tbody>
</table>

Product Serious Eye Damage/Eye Irritation Data
No data available.

Ingredient Eye Damage/Eye Irritation Data

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>Test method</th>
<th>Species</th>
<th>Reported dose</th>
<th>Exposure time</th>
<th>Results</th>
<th>Key literature references and sources for data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sulfuric acid (30 - 40%) CAS#: 7664-93-9</td>
<td>Existing human experience</td>
<td>Human</td>
<td>None reported</td>
<td>None reported</td>
<td>Corrosive to eyes</td>
<td>HSDB (Hazardous Substances Data Bank)</td>
</tr>
</tbody>
</table>

Sensitization Information

Product Sensitization Data

Skin Sensitization Exposure Route No data available.
Respiratory Sensitization Exposure Route No data available.

Ingredient Sensitization Data

Skin Sensitization Exposure Route No data available.
Respiratory Sensitization Exposure Route No data available.

Chronic Toxicity Information

Product Repeat Dose Toxicity Data

Oral Exposure Route No data available.
Dermal Exposure Route No data available.
Inhalation (Dust/Mist) Exposure Route No data available.
Inhalation (Vapor) Exposure Route No data available.
Inhalation (Gas) Exposure Route No data available.

Ingredient Repeat Dose Toxicity Data

Oral Exposure Route No data available
Dermal Exposure Route No data available
Inhalation (Dust/Mist) Exposure Route

Inhalation (Vapor) Exposure Route

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>Endpoint type</th>
<th>Reported dose</th>
<th>Exposure time</th>
<th>Toxicological effects</th>
<th>Key literature references and sources for data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sulfuric acid (30 - 40%)</td>
<td>Human TC_{50}</td>
<td>.003 mg/L</td>
<td>168 days</td>
<td>Musculoskeletal</td>
<td>RTECS (Registry of Toxic Effects of Chemical Substances)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Changes in teeth and supporting structures</td>
<td></td>
</tr>
</tbody>
</table>

Inhalation (Gas) Exposure Route

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>CAS No</th>
<th>ACGIH</th>
<th>IARC</th>
<th>NTP</th>
<th>OSHA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sulfuric acid</td>
<td>7664-93-9</td>
<td>A2</td>
<td>Group 1</td>
<td>Known</td>
<td>X</td>
</tr>
<tr>
<td>Molybdate (Mo70246-), hexaammonium</td>
<td>12027-67-7</td>
<td>A3</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Ammonium vanadate</td>
<td>7803-55-6</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Legend

ACGIH (American Conference of Governmental Industrial Hygienists) | A2 - Suspected Human Carcinogen A3 - Animal Carcinogen
IARC (International Agency for Research on Cancer) | Group 1 - Carcinogenic to Humans
NTP (National Toxicology Program) | Known - Known Carcinogen
OSHA (Occupational Safety and Health Administration of the US Department of Labor) | X - Present

Product Carcinogenicity Data

Oral Exposure Route

Dermal Exposure Route

Inhalation (Dust/Mist) Exposure Route

Inhalation (Vapor) Exposure Route

Inhalation (Gas) Exposure Route

No data available.

Ingredient Carcinogenicity Data

Oral Exposure Route

Dermal Exposure Route

Inhalation (Dust/Mist) Exposure Route

Inhalation (Vapor) Exposure Route

Inhalation (Gas) Exposure Route

No data available.

Product Germ Cell Mutagenicity/in vitro Data

No data available.

Ingredient Germ Cell Mutagenicity/in vitro Data

Toxicological data for ingredients is not indicative of likely harm.

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>Test</th>
<th>Cell Strain</th>
<th>Reported dose</th>
<th>Exposure time</th>
<th>Results</th>
<th>Key literature references and sources for data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemical Name</td>
<td>Test</td>
<td>Cell Strain</td>
<td>Reported dose</td>
<td>Exposure time</td>
<td>Results</td>
<td>Key literature references and sources for data</td>
</tr>
<tr>
<td>---------------</td>
<td>------</td>
<td>-------------</td>
<td>---------------</td>
<td>---------------</td>
<td>---------</td>
<td>---------------------------------------------</td>
</tr>
<tr>
<td>Ammonium vanadate (0.1 - 1%) CAS#: 7803-55-6</td>
<td>DNA damage</td>
<td>Human lymphocyte</td>
<td>0.2 mmol/L</td>
<td>None reported</td>
<td>Positive test result for mutagenicity</td>
<td>RTECS (Registry of Toxic Effects of Chemical Substances)</td>
</tr>
<tr>
<td>Ammonium vanadate (0.1 - 1%) CAS#: 7803-55-6</td>
<td>Mutation in mammalian somatic cells</td>
<td>Hamster lung</td>
<td>0.005 mmol/L</td>
<td>None reported</td>
<td>Positive test result for mutagenicity</td>
<td>RTECS (Registry of Toxic Effects of Chemical Substances)</td>
</tr>
</tbody>
</table>

**Oral Exposure Route**
- No data available

**Dermal Exposure Route**
- No data available

**Inhalation (Dust/Mist) Exposure Route**
- No data available

**Inhalation (Vapor) Exposure Route**
- No data available

**Inhalation (Gas) Exposure Route**
- No data available

**Ingredient Germ Cell Mutagenicity invivoData**

**Oral Exposure Route**
- No data available

**Dermal Exposure Route**
- No data available

**Inhalation (Dust/Mist) Exposure Route**
- No data available

**Inhalation (Vapor) Exposure Route**
- No data available

**Inhalation (Gas) Exposure Route**
- No data available

**Oral Exposure Route**
- No data available

**Dermal Exposure Route**
- No data available

**Inhalation (Dust/Mist) Exposure Route**
- No data available

**Inhalation (Vapor) Exposure Route**
- No data available

**Inhalation (Gas) Exposure Route**
- No data available

**Ingredient Reproductive Toxicity Data**

**Oral Exposure Route**
- No data available

**Dermal Exposure Route**
- No data available

**Inhalation (Dust/Mist) Exposure Route**
- No data available

**Inhalation (Vapor) Exposure Route**
- No data available

**Inhalation (Gas) Exposure Route**
- No data available

**Inhalation (Vapor) Exposure Route**
- Toxicological data for ingredients is not indicative of likely harm.

**Chemical Name**
- Sulfuric acid (30 - 40%)

**Endpoint type**
- Rabbit TcL

**Reported dose**
- 0.02 mg/L

**Exposure time**
- 7 hours

**Toxicological effects**
- Specific Development Abnormalities

**Key literature references and sources for data**
- HSDB (Hazardous Substances Data Bank)
Inhalation (Gas) Exposure Route: No data available

12. ECOLOGICAL INFORMATION

Ecotoxicity: Harmful to aquatic life.

Product Ecological Data

Aquatic toxicity

Fish: No data available
Crustacea: No data available
Algae: No data available
Terrestrial toxicity: No data available
Soil: No data available
Vertebrates: No data available
Invertebrates: No data available

Ingredient Ecological Data

Aquatic toxicity

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>Exposure time</th>
<th>Species</th>
<th>Endpoint type</th>
<th>Reported dose</th>
<th>Key literature references and sources for data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Molybdate (Mo7O246-), hexaammonium (1 - 5%)</td>
<td>96 hours</td>
<td>Oncorhynchus mykiss</td>
<td>LC₅₀</td>
<td>320 mg/L</td>
<td>Vendor SDS</td>
</tr>
<tr>
<td>Ammonium vanadate (0.1 - 1%)</td>
<td>96 hours</td>
<td>None reported</td>
<td>LC₅₀</td>
<td>2.6 mg/L</td>
<td>EPA (United States Environmental Protection Agency)</td>
</tr>
<tr>
<td>Sulfuric acid (30 - 40%)</td>
<td>96 hours</td>
<td>Lepomis macrochirus</td>
<td>LC₅₀</td>
<td>&gt; 16 mg/L</td>
<td>IUCLID (The International Uniform Chemical Information Database)</td>
</tr>
<tr>
<td>Ammonium vanadate (0.1 - 1%)</td>
<td>144 hours</td>
<td>Poecilia reticulata</td>
<td>LC₅₀</td>
<td>1.5 mg/L</td>
<td>EPA (United States Environmental Protection Agency)</td>
</tr>
</tbody>
</table>

Crustacea

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>Exposure time</th>
<th>Species</th>
<th>Endpoint type</th>
<th>Reported dose</th>
<th>Key literature references and sources for data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Molybdate (Mo7O246-), hexaammonium (1 - 5%)</td>
<td>48 Hours</td>
<td>Daphnia magna</td>
<td>EC₅₀</td>
<td>140 mg/L</td>
<td>Vendor SDS</td>
</tr>
<tr>
<td>Sulfuric acid</td>
<td>48 hours</td>
<td>Crangon crangon</td>
<td>EC₅₀</td>
<td>&gt; 70 mg/L</td>
<td>IUCLID (The International Uniform Chemical Information Database)</td>
</tr>
</tbody>
</table>
(30 - 40%) CAS#: 7664-93-9

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>Exposure time</th>
<th>Species</th>
<th>Endpoint type</th>
<th>Reported dose</th>
<th>Key literature references and sources for data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Molybdate (Mo7O246-), hexaammonium (1 - 5%) CAS#: 12027-67-7</td>
<td>72 Hours</td>
<td>Desmodesmus subspicatus</td>
<td>EC₅₀</td>
<td>41 mg/L</td>
<td>Vendor SDS</td>
</tr>
</tbody>
</table>

**Terrestrial toxicity**

**Soil**
No data available

**Vertebrates**
No data available

**Invertebrates**
No data available

**Other Information**

**Canadian Environmental Protection Act (CEPA) - Domestic Substances List (DSL): Environmentally Hazardous Substances Categorizations**

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>Category</th>
<th>Persistent</th>
<th>Bioaccumulation</th>
<th>Inherently Toxic to Aquatic Organisms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Molybdate (Mo7O246-), hexaammonium (1 - 5%) CAS#: 12027-67-7</td>
<td>Inorganics</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Ammonium vanadate (0.1 - 1%) CAS#: 7803-55-6</td>
<td>Inorganics</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
</tr>
</tbody>
</table>

**Persistence and degradability**
None known.

**Product Biodegradability Data**
If available, see ingredient data below.

**Ingredient Biodegradability Data**
Test data reported below

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>Test method</th>
<th>Biodegradation</th>
<th>Exposure time</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Molybdate (Mo7O246-), hexaammonium (1 - 5%) CAS#: 12027-67-7</td>
<td>None reported</td>
<td>None reported</td>
<td>None reported</td>
<td>Readily biodegradable</td>
</tr>
</tbody>
</table>

**Bioaccumulation**
None known.

**Product Bioaccumulation Data**
Test data reported below.

**Ingredient Bioaccumulation Data**
No data available
Additional information

**Product Information**

Partition Coefficient (n-octanol/water) Not applicable

**Ingredient Information**

**Mobility**
Mobility in soil: High mobility. If available, see ingredient data below.

**Product Information**

Soil Organic Carbon-Water Partition Coefficient Not applicable

**Ingredient Information**
No data available

**Additional information**

**Water solubility**

<table>
<thead>
<tr>
<th>Water solubility classification</th>
<th>Water solubility</th>
<th>Water Solubility Temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soluble</td>
<td>&gt; 1000 mg/L</td>
<td>25 °C / 77 °F</td>
</tr>
</tbody>
</table>

**Ingredient Information**

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>Water solubility classification</th>
<th>Water solubility</th>
<th>Water solubility temperature °C</th>
<th>Water solubility temperature °F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sulfuric acid CAS#: 7664-93-9</td>
<td>Soluble</td>
<td>&gt; 1000 mg/L</td>
<td>25 °C</td>
<td>77 °F</td>
</tr>
<tr>
<td>Molybdate (Mo7O24)-, hexaammonium CAS#: 12027-67-7</td>
<td>Soluble</td>
<td>&gt; 1000 mg/L</td>
<td>25 °C</td>
<td>77 °F</td>
</tr>
<tr>
<td>Ammonium vanadate CAS#: 7803-55-6</td>
<td>Moderately soluble</td>
<td>520 mg/L</td>
<td>15 °C</td>
<td>59 °F</td>
</tr>
</tbody>
</table>

**Other adverse effects**
No information available.

---

### 13. DISPOSAL CONSIDERATIONS

**Waste treatment methods**

**Disposal of wastes**
Disposal should be in accordance with applicable regional, national, and local laws and regulations.

**Contaminated packaging**
Do not reuse container.

**US EPA Waste Number**
D002, P119

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>RCRA</th>
<th>RCRA - Basis for Listing</th>
<th>RCRA - D Series Wastes</th>
<th>RCRA - U Series Wastes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ammonium vanadate</td>
<td>P119</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>
7803-55-6

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Ammonium vanadate 7803-55-6</td>
<td>-</td>
<td>P119</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Special instructions for disposal: Work in an approved fume hood. Dilute to 3 to 5 times the volume with cold water. Adjust to a pH between 6 and 9 with an alkali, such as soda ash or sodium bicarbonate. Open cold water tap completely, slowly pour the reacted material to the drain. Allow cold water to run for 5 minutes to completely flush the system.

14. TRANSPORT INFORMATION

DOT
- UN/ID no: UN3264
- Proper shipping name: Corrosive Liquid, Acidic, Inorganic, N.O.S.
- DOT Technical Name: (<45% Sulfuric Acid solution)
- Hazard Class: 8
- Packing Group: III
- Emergency Response Guide Number: 154

TDG
- UN/ID no: UN3264
- Proper shipping name: Corrosive Liquid, Acidic, Inorganic, N.O.S.
- TDG Technical Name: (<45% Sulfuric Acid solution)
- Hazard Class: 8
- Packing Group: III

IATA
- UN/ID no: UN3264
- Proper shipping name: Corrosive Liquid, Acidic, Inorganic, N.O.S.
- IATA Technical Name: (<45% Sulfuric Acid solution)
- Hazard Class: 8
- Packing Group: III
- ERG Code: 154

IMDG
- UN/ID no: UN3264
- IMDG Technical Name: (<45% Sulfuric Acid solution)
- Hazard Class: 8
- Packing Group: III

Note: No special precautions necessary.

Additional information
There is a possibility that this product could be contained in a reagent set or kit composed of various compatible dangerous goods. If the item is not in a reagent set or kit, the classification given above applies.
If the item is part of a reagent set or kit the classification would change to the following: UN3316 Chemical Kit, Hazard Class 9, Packing Group II or III.
If the item is not regulated, the Chemical Kit classification does not apply.

15. REGULATORY INFORMATION

National Inventories
- TSCA: Complies
- DSL/NDSL: Complies

TSCA- United States Toxic Substances Control Act Section 8(b) Inventory
DSL/NDSL- Canadian Domestic Substances List/Non-Domestic Substances List
International Inventories

EINECS/ELINCS  Complies
ENCS  Complies
IECSC  Complies
KECL  Complies
PICCS  Complies
TCSI  Complies
AICS  Complies
NZIoC  Complies

EINECS/ELINCS- European Inventory of Existing Chemical Substances/European List of Notified Chemical Substances
ENCS- Japan Existing and New Chemical Substances
IECSC- China Inventory of Existing Chemical Substances
KECL- Korean Existing and Evaluated Chemical Substances
PICCS- Philippines Inventory of Chemicals and Chemical Substances
TCSI- Taiwan Chemical Substances Inventory
AICS- Australian Inventory of Chemical Substances
NZIoC- New Zealand Inventory of Chemicals

US Federal Regulations

SARA 313
Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA). This product contains a chemical or chemicals which are subject to the reporting requirements of the Act and Title 40 of the Code of Federal Regulations, Part 372

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>SARA 313 - Threshold Values %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sulfuric acid (CAS #: 7664-93-9)</td>
<td>1.0</td>
</tr>
<tr>
<td>Ammonium vanadate (CAS #: 7803-55-6)</td>
<td>1.0</td>
</tr>
</tbody>
</table>

SARA 311/312 Hazard Categories

Acute health hazard | Yes
Chronic Health Hazard | Yes
Fire hazard | No
Sudden release of pressure hazard | No
Reactive Hazard | No

CWA (Clean Water Act)
This product does not contain any substances regulated as pollutants pursuant to the Clean Water Act (40 CFR 122.21 and 40 CFR 122.42)

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>CWA - Reportable Quantities</th>
<th>CWA - Toxic Pollutants</th>
<th>CWA - Priority Pollutants</th>
<th>CWA - Hazardous Substances</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sulfuric acid 7664-93-9</td>
<td>1000 lb</td>
<td>-</td>
<td>-</td>
<td>X</td>
</tr>
</tbody>
</table>

CERCLA
This material, as supplied, does not contain any substances regulated as hazardous substances under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302) or the Superfund Amendments and Reauthorization Act (SARA) (40 CFR 355). There may be specific reporting requirements at the local, regional, or state level pertaining to releases of this material

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>Hazardous Substances RQs</th>
<th>CERCLA/SARA RQ</th>
<th>Reportable Quantity (RQ)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sulfuric acid 7664-93-9</td>
<td>1000 lb</td>
<td>1000 lb</td>
<td>RQ, 1000 lb final RQ, RQ 454 kg final RQ</td>
</tr>
<tr>
<td>Ammonium vanadate 7803-55-6</td>
<td>1000 lb</td>
<td>-</td>
<td>RQ 1000 lb final RQ, RQ 454 kg final RQ</td>
</tr>
</tbody>
</table>

U.S. - DEA (Drug Enforcement Administration) List I & List II
US State Regulations

California Proposition 65
This product does not contain any Proposition 65 chemicals

U.S. State Right-to-Know Regulations

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>New Jersey</th>
<th>Massachusetts</th>
<th>Pennsylvania</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sulfuric acid (30 - 40%) CAS#: 7664-93-9</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Ammonium vanadate 7803-55-6</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

U.S. EPA Label Information
EPA Pesticide Registration Number Not applicable

16. OTHER INFORMATION, INCLUDING DATE OF PREPARATION OF THE LAST REVISION

Additional information

Global Automotive Declarable Substance List (GADSL)
Not applicable

Special Comments
None

NFPA and HMIS Classifications

<table>
<thead>
<tr>
<th>NFPA</th>
<th>Health hazards - 3</th>
<th>Flammability - 0</th>
<th>Instability - 0</th>
<th>Physical and Chemical Properties</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Personal protection - X</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>HMIS</th>
<th>Health hazards - 3</th>
<th>Flammability - 0</th>
<th>Physical hazards - 0</th>
<th></th>
</tr>
</thead>
</table>

Key or legend to abbreviations and acronyms used in the safety data sheet

NIOSH IDLH  Immediately Dangerous to Life or Health
ACGIH  ACGIH (American Conference of Governmental Industrial Hygienists)
NDF  no data

Legend - Section 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

TWA  TWA (time-weighted average)  STEL  STEL (Short Term Exposure Limit)
MAC  Maximum Allowable Concentration  Ceiling  Ceiling Limit Value
X  Listed  Vacated  These values have no official status. The only binding levels of contaminants are those listed in the final OSHA PEL. These lists are
for reference purposes only. Please note that some reference state regulations of these "liberated" exposure limits in their state regulations.

Skin sensitization

Hazard Designation

Reproductive toxicant

Prepared By: Hach Product Compliance Department

Issue Date: 20-May-2016

Revision Date: 15-Dec-2016

Revision Note: None

Disclaimer

USER RESPONSIBILITY: Each user should read and understand this information and incorporate it in individual site safety programs in accordance with applicable hazard communication standards and regulations.

THE INFORMATION CONTAINED HEREIN IS BASED ON DATA CONSIDERED TO BE ACCURATE. HOWEVER, NO WARRANTY IS EXPRESSED OR IMPLIED REGARDING THE ACCURACY OF THESE DATA OR THE RESULTS TO BE OBTAINED FROM THE USE THEREOF.

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End of Safety Data Sheet