## Section 1. Chemical Product and Company Identification

<table>
<thead>
<tr>
<th>Common Name/Trade Name</th>
<th>Catalog Number(s).</th>
<th>CAS#</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,1'-Dimethyl-4,4'-bipyridinium Dichloride, hydrate</td>
<td>D2943</td>
<td>1910-42-5</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Manufacturer</th>
<th>RTECS</th>
<th>CI#</th>
</tr>
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<tbody>
<tr>
<td>SPECTRUM LABORATORY PRODUCTS INC. 14422 S. SAN PEDRO STREET GARDENA, CA 90248</td>
<td>DW2275000</td>
<td>Not available.</td>
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</table>

<table>
<thead>
<tr>
<th>Chemical Formula</th>
<th>Supplier</th>
</tr>
</thead>
<tbody>
<tr>
<td>C12-H14-Cl2-N2.xH20</td>
<td>SPECTRUM LABORATORY PRODUCTS INC. 14422 S. SAN PEDRO STREET GARDENA, CA 90248</td>
</tr>
</tbody>
</table>

### IN CASE OF EMERGENCY
CHEMTREC (24hr) 800-424-9300
CALL (310) 516-8000

## Section 2. Composition and Information on Ingredients

<table>
<thead>
<tr>
<th>Name</th>
<th>Exposure Limits</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>TWA (mg/m³)</td>
</tr>
<tr>
<td>1) 1,1'-Dimethyl-4,4'-bipyridinium Dichloride, hydrate</td>
<td>1910-42-5</td>
</tr>
</tbody>
</table>

### Toxicological Data on Ingredients

#### ORAL (LD₅₀):
- Acute: 57 mg/kg [Rat]. 120 mg/kg [Mouse]. 22 mg/kg [Guinea pig].

#### DERMAL (LD₅₀):
- Acute: 80 mg/kg [Rat]. 325 mg/kg [Rabbit]. 600 mg/kg [Duck].

#### DUST (LC₅₀):
- Acute: 1 mg/m³ 6 hours [Rat]. 2.2 mg/m³ 2.5 hours [Mouse].
### Section 3. Hazards Identification

<table>
<thead>
<tr>
<th>Potential Acute Health Effects</th>
<th>Hazardous in case of skin contact (permeator), of eye contact (irritant), of ingestion, of inhalation (lung irritant). Slightly hazardous in case of skin contact (irritant). Severe over-exposure can result in death.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Potential Chronic Health Effects</td>
<td>CARCINOGENIC EFFECTS: Not available. MUTAGENIC EFFECTS: Mutagenic for mammalian somatic cells. Mutagenic for bacteria and/or yeast. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance is toxic to lungs. The substance may be toxic to kidneys, liver. Repeated or prolonged exposure to the substance can produce target organs damage. Repeated exposure to a highly toxic material may produce general deterioration of health by an accumulation in one or many human organs.</td>
</tr>
</tbody>
</table>

### 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. Get medical attention. |
| Skin Contact | In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Cover the irritated skin with an emollient. Cold water may be used. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention immediately. |
| 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 immediately. |
| Serious Inhalation | Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. WARNING: It may be hazardous to the person providing aid to give mouth-to-mouth resuscitation when the inhaled material is toxic, infectious or corrosive. Seek immediate medical attention. |
| Ingestion | If swallowed, do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention immediately. |
| Serious Ingestion | Not available. |

### Section 5. Fire and Explosion Data

| Flammability of the Product | May be combustible at high temperature. |
| Auto-Ignition Temperature | Not available. |
| Flash Points | Not available. |
| Flammable Limits | Not available. |
| Products of Combustion | These products are carbon oxides (CO, CO2), nitrogen oxides (NO, NO2...), halogenated compounds. |
| Fire Hazards in Presence of Various Substances | Slightly flammable to flammable in presence of heat. |
| Fire Fighting Media and Instructions | SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use water spray, fog or foam. Do not use water jet. |
| Special Remarks on Fire Hazards | When heated to decomposition it emits toxic fumes. |
| 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.

Large Spill
Poisonous solid.
Stop leak if without risk. Do not get water inside container. Do not touch spilled material. Use water spray to reduce vapors. Prevent entry into sewers, basements or confined areas; dike if needed. Eliminate all ignition sources. Call for assistance on disposal. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7. Handling and Storage

Precautions
Keep away from heat. Keep away from sources of ignition. Ground all equipment containing material. 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 oxidizing agents.

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

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: 0.5 (mg/m³) from OSHA (PEL) [United States] Inhalation Respirable.
TWA: 0.1 (mg/m³) from ACGIH (TLV) [United States] Inhalation Respirable.
TWA: 0.1 (mg/m³) from NIOSH [United States] Inhalation Respirable.
TWA: 0.5 (mg/m³) from ACGIH (TLV) [United States] Inhalation Total.
TWA: 0.1 STEL: 0.3 (mg/m³) [Canada] Inhalation Respirable.
TWA: 0.08 (mg/m³) [United Kingdom (UK)] Inhalation Respirable.

Consult local authorities for acceptable exposure limits.

Section 9. Physical and Chemical Properties

Physical state and appearance
Solid. (Powdered solid.)

Molecular Weight
257.16 g/mole +xH20

pH (1% soln/water)
Not available.

Boiling Point
Not available.

Melting Point
Decomposition temperature: >300°C (572°F)

Critical Temperature
Not available.

Specific Gravity
1.24-1.26 (Water = 1)

Vapor Pressure
Not applicable.

Vapor Density
Not available.

Volatility
Not available.

Odor
Ammoniacal. (Slight.)

Taste
Not available.

Color
White to yellowish. Off-white.

Water/Oil Dist. Coeff.
Not available.

Dispersal Properties
See solubility in water.

Continued on Next Page
**1,1’-Dimethyl-4,4’-bipyridinium Dichloride, hydrate**

**Solubility**
- Easily soluble in cold water.
- Very slightly soluble in methanol.
- Insoluble in acetone.
- Slightly soluble in lower alcohols.
- Insoluble in hydrocarbons.

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**Section 10. Stability and Reactivity Data**

**Stability**
- The product is stable.

**Instability Temperature**
- Not available.

**Conditions of Instability**
- Excess heat, incompatible materials.

**Incompatibility with various substances**
- Reactive with oxidizing agents.

**Corrosivity**
- Not available.

**Special Remarks on Reactivity**
- Incompatible with alkylaryl-sulfonate wetting agents.
- It is corrosive to metals.

**Special Remarks on Corrosivity**
- It is corrosive to metals.

**Polymerization**
- Will not occur.

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**Section 11. Toxicological Information**

**Routes of Entry**
- Absorbed through skin. Dermal contact. Inhalation. Ingestion.

**Toxicity to Animals**
- Acute oral toxicity (LD$_{50}$) 22 mg/kg [Guinea pig].
- Acute dermal toxicity (LD$_{50}$) 80 mg/kg [Rat].
- Acute toxicity of the dust (LC$_{50}$) 2.2 mg/m$^3$ 2.5 hours [Mouse].

**Chronic Effects on Humans**
- **MUTAGENIC EFFECTS:** Mutagenic for mammalian somatic cells. Mutagenic for bacteria and/or yeast. Causes damage to the following organs: lungs. May cause damage to the following organs: kidneys, liver.

**Other Toxic Effects on Humans**
- Hazardous in case of skin contact (permeator), of ingestion, of inhalation (lung irritant). Slightly hazardous in case of skin contact (irritant).

**Special Remarks on Toxicity to Animals**
- Lethal Dose/Conc 50% Kill:
  - LD$_{50}$[Dog] - Route: Oral; Dose: 25 mg/kg
  - LD$_{50}$[Cat] - Route: Oral; Dose: 35 mg/kg
  - LD$_{50}$[Pig] - Route: Oral; Dose: 30 mg/kg
  - LD$_{50}$[Goat., Sheep] - Route: Oral; Dose: 30 mg/kg
  - LD$_{50}$[Monkey] - Route: Oral; Dose: 50 mg/kg
  - LD$_{50}$[Chicken] - Route: Oral; Dose: 262 mg/kg
  - LD$_{50}$[Duck] - Route: Oral; Dose: 199 mg/kg
  - LD$_{50}$[Turkey] - Route: Skin; Dose: 375 mg/kg

**Special Remarks on Chronic Effects on Humans**
- May cause adverse reproductive effects and birth defects (teratogenic).
- May affect genetic material (mutagenic).

**Special Remarks on other Toxic Effects on Humans**
- Acute Potential Health Effects:
  - Skin: May cause skin irritation. It can be absorbed through the skin. Harmful if absorbed through the skin.
  - Eyes: Causes mild to severe eye irritation. May cause corneal injury and corneal opacification.
  - Inhalation: Harmful if inhaled. Symptoms of inhalation exposure may include respiratory depression, respiratory stimulation, dyspnea, epistaxis, headaches, cough, sore throat. It may also affect hair.
  - Ingestion: Harmful if swallowed. It may cause hypermotility, diarrhea, abdominal cramping, nausea, vomiting, gastrointestinal tract irritation, sore throat, cough, difficulty swallowing, fever, decreased appetite, hypotension. It may cause emphysema, acute pulmonary edema, and delayed progressive pulmonary fibrosis. Delayed progressive pulmonary fibrosis may lead to death after ingestion. Progressive pulmonary fibrosis is a profuse cellular proliferation of the lung tissue resembling the aftermath of a severe chronic inflammatory reaction after ingestion of this material. It may affect the heart, liver (hepatocellular damage, jaundice), and kidneys (acute tubular necrosis, proteinuria, hematuria, acute glomerulonephritis), blood (methemoglobinemia), behavior/central nervous system (somnolence, excitement), brain, hair, blood (pigmented or nucleated red blood cells; changes in white blood cell count). It may cause hypoglycemia.

Chronic Potential Health Effects:
- Ingestion: Prolonged or repeated ingestion may cause weight loss, and symptoms similar to acute ingestion.

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**Continued on Next Page**
1,1'-Dimethyl-4,4'-bipyridinium Dichloride, hydrate

**Section 12. Ecological Information**

**Ecotoxicity**
Ecotoxicity in water (LC50): 11-19 mg/l 96 hours [Fish (Oncorhynchus mykiss)]. 8.5-19 mg/l 96 hours [Fish (Lepomis macrohirus)]. 15 mg/l 96 hours [Fish (Cyprinus carpio)].

**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 as toxic as the product itself.

**Special Remarks on the Products of Biodegradation**
Not available.

**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**
CLASS 6.1: Poisonous material.

**Identification**
UNNA: 2811 : Toxic solids, organic, n.o.s (1,1'-dimethyl-4,4'-bipyridinium dichloride) PG: III

**Special Provisions for Transport**
Not available.

**DOT (Pictograms)**

**Section 15. Other Regulatory Information and Pictograms**

**Federal and State Regulations**
New York release reporting list: 1,1'-Dimethyl-4,4'-bipyridinium Dichloride, hydrate
Pennsylvania RTK: 1,1'-Dimethyl-4,4'-bipyridinium Dichloride, hydrate
Minnesota: 1,1'-Dimethyl-4,4'-bipyridinium Dichloride, hydrate
Massachusetts RTK: 1,1'-Dimethyl-4,4'-bipyridinium Dichloride, hydrate
New Jersey: 1,1'-Dimethyl-4,4'-bipyridinium Dichloride, hydrate
New Jersey spill list: 1,1'-Dimethyl-4,4'-bipyridinium Dichloride, hydrate
California Director's List of Hazardous Substances: 1,1'-Dimethyl-4,4'-bipyridinium Dichloride, hydrate
SARA 302/304/311/312 extremely hazardous substances: 1,1'-Dimethyl-4,4'-bipyridinium Dichloride, hydrate
SARA 313 toxic chemical notification and release reporting: 1,1'-Dimethyl-4,4'-bipyridinium Dichloride, hydrate
CERCLA: Hazardous substances: 1,1'-Dimethyl-4,4'-bipyridinium Dichloride, hydrate: 10 lbs. (4.536 kg)

**California Proposition 65 Warnings**
California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer which would require a warning under the statute: No products were found.

California prop. 65: This product contains the following ingredients for which the State of California has found to cause birth defects which would require a warning under the statute: No products were found.

**Other Regulations**
EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances (EINECS No. 217-615-7).
Canada: Not listed on Canadian Domestic Substance List (DSL) or Canadian Non-Domestic Substances List (NDSL)
China: Not listed on National Inventory.
Japan: Listed on National Inventory (ENCS).
Korea: Listed on National Inventory (KECI).
Philippines: Listed on National Inventory (PICCS).
Australia: Listed in AICS.

**Other Classifications**
WHMIS (Canada) CLASS D-1A: Material causing immediate and serious toxic effects (VERY TOXIC).
CLASS D-2A: Material causing other toxic effects (VERY TOXIC).

Continued on Next Page
1,1'-Dimethyl-4,4'-bipyridinium Dichloride, hydrate

<table>
<thead>
<tr>
<th>Hazard</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>R24/25</td>
<td>Toxic in contact with skin and if swallowed.</td>
</tr>
<tr>
<td>R26</td>
<td>Very toxic by inhalation.</td>
</tr>
<tr>
<td>R36/37/38</td>
<td>Irritating to eyes, respiratory system and skin.</td>
</tr>
<tr>
<td>R48/25</td>
<td>Toxic: danger of serious damage to health by prolonged exposure if swallowed.</td>
</tr>
<tr>
<td>R50/53</td>
<td>Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.</td>
</tr>
<tr>
<td>S22</td>
<td>Do not breathe dust.</td>
</tr>
<tr>
<td>S28</td>
<td>After contact with skin, wash immediately with plenty of water.</td>
</tr>
<tr>
<td>S36/37/39</td>
<td>Wear suitable protective clothing, gloves and eye/face protection.</td>
</tr>
<tr>
<td>S45</td>
<td>In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).</td>
</tr>
<tr>
<td>S60</td>
<td>This material and its container must be disposed of as hazardous waste.</td>
</tr>
<tr>
<td>S61</td>
<td>Avoid release to the environment. Refer to special instructions/Safety data sheets.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>HMIS (U.S.A.)</th>
<th>National Fire Protection Association (U.S.A.)</th>
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<tbody>
<tr>
<td>Health Hazard</td>
<td>2</td>
</tr>
<tr>
<td>Fire Hazard</td>
<td>1</td>
</tr>
<tr>
<td>Reactivity</td>
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<tr>
<td>Personal Protection</td>
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<table>
<thead>
<tr>
<th>WHMIS (Canada) (Pictograms)</th>
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<table>
<thead>
<tr>
<th>Protective Equipment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gloves.</td>
</tr>
<tr>
<td>Lab coat.</td>
</tr>
<tr>
<td>Dust respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate.</td>
</tr>
<tr>
<td>Splash goggles.</td>
</tr>
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Continued on Next Page
Section 16. Other Information

<table>
<thead>
<tr>
<th>MSDS Code</th>
<th>D0359</th>
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<tbody>
<tr>
<td>References</td>
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</tr>
<tr>
<td>Other Special Considerations</td>
<td>Major Uses: Herbicide; desiccant</td>
</tr>
<tr>
<td>Validated by Sonia Owen on 12/19/2011.</td>
<td>Verified by Sonia Owen.</td>
</tr>
<tr>
<td>Verified by Sonia Owen.</td>
<td>Printed 12/19/2011.</td>
</tr>
</tbody>
</table>

CALL (310) 516-8000

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.