1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers
Product name: Folin & Ciocalteu’s phenol reagent
Product Number: F9252
Brand: Sigma-Aldrich

1.2 Relevant identified uses of the substance or mixture and uses advised against
Identified uses: Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet
Company: Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO  63103
USA
Telephone: +1 800-325-5832
Fax: +1 800-325-5052

1.4 Emergency telephone number
Emergency Phone #: (314) 776-6555

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture
GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Corrosive to metals (Category 1), H290
Skin corrosion (Category 1), H314
Serious eye damage (Category 1), H318

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Signal word: Danger

Hazard statement(s)
H290 May be corrosive to metals.
H314 Causes severe skin burns and eye damage.
H318 Causes serious eye damage.

Precautionary statement(s)
P234 Keep only in original container.
P264 Wash skin thoroughly after handling.
P280 Wear protective gloves/ protective clothing/ eye protection/ face protection.
P301 + P330 + P331 IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.
P303 + P361 + P353 IF ON SKIN (or hair): Take off immediately all contaminated clothing.
Rinse skin with water/shower.
P304 + P340 + P310 IF INHALED: Remove person to fresh air and keep comfortable for
breathing. Immediately call a POISON CENTER/doctor.

P305 + P351 + P338 + P310 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a POISON CENTER/doctor.

P363 Wash contaminated clothing before reuse.

P390 Absorb spillage to prevent material damage.

P405 Store locked up.

P406 Store in corrosive resistant stainless steel container with a resistant inner liner.

P501 Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.2 Mixtures

Synonyms : protein assay

Hazardous components

<table>
<thead>
<tr>
<th>Component</th>
<th>Classification</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lithium sulphate</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CAS-No.</td>
<td>10377-48-7</td>
<td>Acute Tox. 4; Eye Irrit. 2A; H302, H319</td>
</tr>
<tr>
<td>EC-No.</td>
<td>233-820-4</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>&gt;= 10 - &lt; 20 %</td>
</tr>
<tr>
<td>Hydrochloric acid</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CAS-No.</td>
<td>7647-01-0</td>
<td>Met. Corr. 1; Skin Corr. 1B; Eye Dam. 1; STOT SE 3; H290, H314, H335</td>
</tr>
<tr>
<td>EC-No.</td>
<td>231-595-7</td>
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</tr>
<tr>
<td>Index-No.</td>
<td>017-002-01-X</td>
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</tr>
<tr>
<td>Registration number</td>
<td>01-2119484862-27-XXXX</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>&gt;= 5 - &lt; 10 %</td>
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<tr>
<td>Phosphoric acid</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CAS-No.</td>
<td>7664-38-2</td>
<td>Met. Corr. 1; Skin Corr. 1B; Eye Dam. 1; H290, H314, H318</td>
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<td>EC-No.</td>
<td>231-633-2</td>
<td></td>
</tr>
<tr>
<td>Index-No.</td>
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<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>&gt;= 5 - &lt; 10 %</td>
</tr>
<tr>
<td>Disodium molybdate dihydrate</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CAS-No.</td>
<td>10102-40-6</td>
<td></td>
</tr>
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<td>EC-No.</td>
<td>231-551-7</td>
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</tr>
<tr>
<td></td>
<td></td>
<td>&gt;= 1 - &lt; 5 %</td>
</tr>
<tr>
<td>Disodium wolframate dihydrate</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CAS-No.</td>
<td>10213-10-2</td>
<td>Acute Tox. 4; H302</td>
</tr>
<tr>
<td>EC-No.</td>
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<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>&gt;= 1 - &lt; 5 %</td>
</tr>
</tbody>
</table>

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance. Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Take off contaminated clothing and shoes immediately. Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician. Continue rinsing eyes during transport to hospital.
If swallowed
Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media
Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
No data available

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
No data available

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures
Wear respiratory protection. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas.
For personal protection see section 8.

6.2 Environmental precautions
Do not let product enter drains.

6.3 Methods and materials for containment and cleaning up
Soak up with inert absorbent material and dispose of as hazardous waste. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling
Avoid inhalation of vapour or mist.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.
Storage class (TRGS 510): Non-combustible, corrosive hazardous materials

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS-No.</th>
<th>Value</th>
<th>Control parameters</th>
<th>Basis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydrochloric acid</td>
<td>7647-01-0</td>
<td>C</td>
<td>2.000000 ppm</td>
<td>USA. ACGIH Threshold Limit Values (TLV)</td>
</tr>
</tbody>
</table>

Remarks Upper Respiratory Tract irritation
Not classifiable as a human carcinogen

| C | 5.000000 ppm | USA. NIOSH Recommended Exposure Limits |
| C | 5.000000 ppm | USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants |

Often used in an aqueous solution.

The value in mg/m³ is approximate.
Ceiling limit is to be determined from breathing-zone air samples.

C | 2 ppm | USA. ACGIH Threshold Limit Values (TLV) |

Upper Respiratory Tract irritation
Not classifiable as a human carcinogen

C | 5 ppm | USA. NIOSH Recommended Exposure Limits |

Often used in an aqueous solution.

The value in mg/m³ is approximate.
Ceiling limit is to be determined from breathing-zone air samples.

C | 5 ppm | USA. OSHA - TABLE Z-1 Limits for Air Contaminants - 1910.1000 |

| Phosphoric acid | 7664-38-2 | TWA | 1.000000 mg/m³ | USA. ACGIH Threshold Limit Values (TLV) |

Upper Respiratory Tract irritation
Eye irritation
Skin irritation

TWA | 1 mg/m³ | USA. ACGIH Threshold Limit Values (TLV) |

Upper Respiratory Tract irritation
Eye irritation
Skin irritation

STEL | 3.000000 mg/m³ | USA. ACGIH Threshold Limit Values (TLV) |

Upper Respiratory Tract irritation
Eye irritation
Skin irritation

STEL | 3 mg/m³ | USA. ACGIH Threshold Limit Values (TLV) |

Upper Respiratory Tract irritation
Eye irritation
Skin irritation
<table>
<thead>
<tr>
<th>Substance</th>
<th>Value</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>TWA</td>
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<td>mg/m³ USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants</td>
</tr>
<tr>
<td>TWA</td>
<td>1.000000</td>
<td>mg/m³ USA. NIOSH Recommended Exposure Limits</td>
</tr>
<tr>
<td>ST</td>
<td>3.000000</td>
<td>mg/m³ USA. NIOSH Recommended Exposure Limits</td>
</tr>
<tr>
<td>PEL</td>
<td>1 mg/m³</td>
<td>California permissible exposure limits for chemical contaminants (Title 8, Article 107)</td>
</tr>
<tr>
<td>STEL</td>
<td>3 mg/m³</td>
<td>California permissible exposure limits for chemical contaminants (Title 8, Article 107)</td>
</tr>
<tr>
<td>Disodium molybdate dihydrate</td>
<td>10102-40-6</td>
<td>TWA 5.000000 mg/m³ USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants</td>
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<tr>
<td>TWA</td>
<td>0.500000</td>
<td>mg/m³ USA. ACGIH Threshold Limit Values (TLV)</td>
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<td></td>
<td></td>
<td>Lower Respiratory Tract irritation</td>
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<tr>
<td></td>
<td></td>
<td>Confirmed animal carcinogen with unknown relevance to humans</td>
</tr>
<tr>
<td></td>
<td></td>
<td>See Appendix D - Substances with No Established RELs</td>
</tr>
<tr>
<td>TWA</td>
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<tr>
<td>TWA</td>
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</tr>
<tr>
<td>Disodium wolframate dihydrate</td>
<td>10213-10-2</td>
<td>TWA 1.000000 mg/m³ USA. ACGIH Threshold Limit Values (TLV)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Central Nervous System impairment</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Pulmonary fibrosis varies</td>
</tr>
<tr>
<td></td>
<td></td>
<td>STEL 3.000000 mg/m³ USA. ACGIH Threshold Limit Values (TLV)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Central Nervous System impairment</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Pulmonary fibrosis varies</td>
</tr>
<tr>
<td></td>
<td></td>
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</tr>
<tr>
<td>TWA</td>
<td>1.000000</td>
<td>mg/m³ USA. NIOSH Recommended Exposure Limits</td>
</tr>
<tr>
<td>ST</td>
<td>3.000000</td>
<td>mg/m³ USA. NIOSH Recommended Exposure Limits</td>
</tr>
<tr>
<td>TWA</td>
<td>1 mg/m³</td>
<td>USA. ACGIH Threshold Limit Values (TLV)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Central Nervous System impairment</td>
</tr>
<tr>
<td></td>
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<td>Pulmonary fibrosis varies</td>
</tr>
<tr>
<td></td>
<td></td>
<td>varies</td>
</tr>
<tr>
<td>STEL</td>
<td>3 mg/m³</td>
<td>USA. ACGIH Threshold Limit Values (TLV)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Central Nervous System impairment</td>
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<td></td>
<td>varies</td>
</tr>
<tr>
<td>TWA</td>
<td>1 mg/m³</td>
<td>USA. NIOSH Recommended Exposure Limits</td>
</tr>
<tr>
<td>-----</td>
<td>---------</td>
<td>--------------------------------------</td>
</tr>
<tr>
<td>ST</td>
<td>3 mg/m³</td>
<td>USA. NIOSH Recommended Exposure Limits</td>
</tr>
<tr>
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</tr>
<tr>
<td>STEL</td>
<td>3 mg/m³</td>
<td>California permissible exposure limits for chemical contaminants (Title 8, Article 107)</td>
</tr>
</tbody>
</table>

Hazardous components without workplace control parameters

### 8.2 Exposure controls

#### Appropriate engineering controls

Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

#### Personal protective equipment

**Eye/face protection**

Tightly fitting safety goggles. Faceshield (8-inch minimum). Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

**Skin protection**

Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

**Full contact**

Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested: Dermatril® (KCL 740 / Aldrich Z677272, Size M)

**Splash contact**

Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested: Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374

If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

**Body Protection**

Complete suit protecting against chemicals. The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

**Respiratory protection**

Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

**Control of environmental exposure**

Do not let product enter drains.

### 9. PHYSICAL AND CHEMICAL PROPERTIES

#### 9.1 Information on basic physical and chemical properties

a) Appearance
   Form: liquid
b) Odour pungent  
c) Odour Threshold No data available  
d) pH < 0.5 at 20 °C (68 °F)  
e) Melting point/freezing point No data available  
f) Initial boiling point and boiling range No data available  
g) Flash point No data available  
h) Evaporation rate No data available  
i) Flammability (solid, gas) No data available  
j) Upper/lower flammability or explosive limits No data available  
k) Vapour pressure No data available  
l) Vapour density No data available  
m) Relative density 1.240 g/cm³ at 20 °C (68 °F)  
n) Water solubility soluble  
o) Partition coefficient: n-octanol/water No data available  
p) Auto-ignition temperature No data available  
q) Decomposition temperature No data available  
r) Viscosity No data available  
s) Explosive properties No data available  
t) Oxidizing properties No data available  

9.2 Other safety information  
No data available

10. STABILITY AND REACTIVITY

10.1 Reactivity  
No data available

10.2 Chemical stability  
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions  
No data available

10.4 Conditions to avoid  
No data available

10.5 Incompatible materials  
Strong oxidizing agents, Metals

10.6 Hazardous decomposition products  
Hazardous decomposition products formed under fire conditions. - Sulphur oxides, Oxides of phosphorus, Hydrogen chloride gas, Sodium oxides, Lithium oxides, Tungsten oxide, Molybdenum oxides  
Other decomposition products - No data available  
In the event of fire: see section 5
11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
No data available

Inhalation: No data available
Dermal: No data available

Skin corrosion/irritation
No data available

Serious eye damage/eye irritation
No data available

Respiratory or skin sensitisation
No data available

Germ cell mutagenicity
No data available

Carcinogenicity
IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity
No data available
No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

Additional Information
RTECS: Not available

Large doses of lithium ion have caused dizziness and prostration, and can cause kidney damage if sodium intake is limited. Dehydration, weight loss, dermatological effects, and thyroid disturbances have been reported. Central nervous system effects that include slurred speech, blurred vision, sensory loss, ataxia, and convulsions may occur. Diarrhea, vomiting, and neuromuscular effects such as tremor, clonus, and hyperactive reflexes may occur as a result of repeated exposure to lithium ion. Lithium and its compounds are possible teratogens by analogy to lithium carbonate which has equivocal human teratogenic data and positive animal teratogenic data. Exposure to high concentrations can cause: burning sensation, Cough, wheezing, laryngitis, Shortness of breath, spasm, inflammation and edema of the larynx, spasm, inflammation and edema of the bronchi, pneumonitis, pulmonary edema. Material is extremely destructive to tissue of the mucous membranes and upper respiratory tract, eyes, and skin. To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Liver - Irregularities - Based on Human Evidence
Stomach - Irregularities - Based on Human Evidence
Liver - Irregularities - Based on Human Evidence (Lithium sulphate)
12. ECOLOGICAL INFORMATION

12.1 Toxicity
No data available

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects
No data available

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product
Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN number: 3264  Class: 8  Packing group: III
Proper shipping name: Corrosive liquid, acidic, inorganic, n.o.s. (Hydrochloric acid, Phosphoric acid)
Reportable Quantity (RQ):

Poison Inhalation Hazard: No

IMDG
UN number: 3264  Class: 8  Packing group: III  EMS-No: F-A, S-B
Proper shipping name: CORROSIVE LIQUID, ACIDIC, INORGANIC, N.O.S. (Hydrochloric acid, Phosphoric acid)

IATA
UN number: 3264  Class: 8  Packing group: III
Proper shipping name: Corrosive liquid, acidic, inorganic, n.o.s. (Hydrochloric acid, Phosphoric acid)

15. REGULATORY INFORMATION

SARA 302 Components
No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
The following components are subject to reporting levels established by SARA Title III, Section 313:

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS-No.</th>
<th>Revision Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydrochloric acid</td>
<td>7647-01-0</td>
<td>1993-04-24</td>
</tr>
</tbody>
</table>

SARA 311/312 Hazards
Acute Health Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS-No.</th>
<th>Revision Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydrochloric acid</td>
<td>7647-01-0</td>
<td>1993-04-24</td>
</tr>
</tbody>
</table>
Phosphoric acid 7664-38-2  1993-04-24

**Pennsylvania Right To Know Components**

<table>
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<tr>
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<th>Revision Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water</td>
<td>7732-18-5</td>
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<tr>
<td>Lithium sulphate</td>
<td>10377-48-7</td>
</tr>
<tr>
<td>Hydrochloric acid</td>
<td>7647-01-0</td>
</tr>
<tr>
<td>Phosphoric acid</td>
<td>7664-38-2</td>
</tr>
</tbody>
</table>

**New Jersey Right To Know Components**

<table>
<thead>
<tr>
<th>CAS-No.</th>
<th>Revision Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water</td>
<td>7732-18-5</td>
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<tr>
<td>Lithium sulphate</td>
<td>10377-48-7</td>
</tr>
<tr>
<td>Hydrochloric acid</td>
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<tr>
<td>Phosphoric acid</td>
<td>7664-38-2</td>
</tr>
<tr>
<td>Disodium molybdate dihydrate</td>
<td>10102-40-6</td>
</tr>
<tr>
<td>Disodium wolframate dihydrate</td>
<td>10213-10-2</td>
</tr>
</tbody>
</table>

**California Prop. 65 Components**

This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

### 16. OTHER INFORMATION

**Full text of H-Statements referred to under sections 2 and 3.**

Acute Tox.  Acute toxicity  
Eye Dam.  Serious eye damage  
Eye Irrit.  Eye irritation  
H290  May be corrosive to metals.  
H302  Harmful if swallowed.  
H314  Causes severe skin burns and eye damage.  
H318  Causes serious eye damage.  
H319  Causes serious eye irritation.  
H335  May cause respiratory irritation.  
Met. Corr.  Corrosive to metals  
Skin Corr.  Skin corrosion  
STOT SE  Specific target organ toxicity - single exposure

**HMIS Rating**

| Health hazard: | 3 |
| Chronic Health Hazard: | * |
| Flammability: | 0 |
| Physical Hazard | 0 |

**NFPA Rating**

| Health hazard: | 3 |
| Fire Hazard: | 0 |
| Reactivity Hazard: | 0 |

**Further information**

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