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

Pictogram

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

<table>
<thead>
<tr>
<th>Hazardous components</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Component</strong></td>
</tr>
<tr>
<td><strong>Lithium sulphate</strong></td>
</tr>
<tr>
<td>EC-No.</td>
</tr>
<tr>
<td><strong>Hydrochloric acid</strong></td>
</tr>
<tr>
<td>EC-No.</td>
</tr>
<tr>
<td>Index-No.</td>
</tr>
<tr>
<td>Registration number</td>
</tr>
<tr>
<td><strong>Phosphoric acid</strong></td>
</tr>
<tr>
<td>EC-No.</td>
</tr>
<tr>
<td>Index-No.</td>
</tr>
<tr>
<td><strong>Disodium molybdate dihydrate</strong></td>
</tr>
<tr>
<td>EC-No.</td>
</tr>
<tr>
<td><strong>Disodium wolframate dihydrate</strong></td>
</tr>
<tr>
<td>EC-No.</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
Components with workplace 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>
<tr>
<td>Remarks</td>
<td></td>
<td></td>
<td>Upper Respiratory Tract irritation</td>
<td></td>
</tr>
<tr>
<td>Material</td>
<td>CAS Number</td>
<td>TWA</td>
<td>STEL</td>
<td>Remarks</td>
</tr>
<tr>
<td>---------------------</td>
<td>------------</td>
<td>------------</td>
<td>------------</td>
<td>----------------------------------------------</td>
</tr>
<tr>
<td>Phosphoric acid</td>
<td>7664-38-2</td>
<td>1.000000 mg/m³</td>
<td>3.000000 mg/m³</td>
<td>Upper Respiratory Tract irritation, Eye irritation, Skin irritation (USA. ACGIH Threshold Limit Values (TLV))</td>
</tr>
</tbody>
</table>

**Not classifiable as a human carcinogen**

<table>
<thead>
<tr>
<th>Material</th>
<th>CAS Number</th>
<th>TWA</th>
<th>STEL</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phosphoric acid</td>
<td>7664-38-2</td>
<td>1.000000 mg/m³</td>
<td>3.000000 mg/m³</td>
<td>Upper Respiratory Tract irritation, Eye irritation, Skin irritation (USA. ACGIH Threshold Limit Values (TLV))</td>
</tr>
</tbody>
</table>

**Often used in an aqueous solution.**

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

**Upper Respiratory Tract irritation**

**Not classifiable as a human carcinogen**

**Often used in an aqueous solution.**

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

**Upper Respiratory Tract irritation**

**Eye irritation**

**Skin irritation**

**Upper Respiratory Tract irritation**

**Eye irritation**

**Skin irritation**

**Upper Respiratory Tract irritation**

**Eye irritation**

**Skin irritation**
<table>
<thead>
<tr>
<th>Substance</th>
<th>TWA</th>
<th>USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disodium molybdate dihydrate 10102-40-6</td>
<td>5.000000 mg/m³</td>
<td>USA. NIOSH Recommended Exposure Limits</td>
</tr>
<tr>
<td>Disodium wolframate dihydrate 10213-10-2</td>
<td>1.000000 mg/m³</td>
<td>USA. ACGIH Threshold Limit Values (TLV)</td>
</tr>
</tbody>
</table>

Disodium molybdate dihydrate 10102-40-6

<table>
<thead>
<tr>
<th>Exposure Limit</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>TWA 1.000000 mg/m³</td>
<td>USA. NIOSH Recommended Exposure Limits</td>
</tr>
<tr>
<td>TWA 0.500000 mg/m³</td>
<td>USA. ACGIH Threshold Limit Values (TLV)</td>
</tr>
</tbody>
</table>

**Violence**: Lower Respiratory Tract irritation

Confirmed animal carcinogen with unknown relevance to humans

**Sensitivities**: Central Nervous System impairment

Pulmonary fibrosis varies

**Chemical Name**: Disodium molybdate dihydrate 10102-40-6

**CAS No.**: 10102-40-6

**Synonyms**: Disodium molybdenum octahydrate, Molybdate disodium, Sodium molybdate dihydrate

**Physical Properties**: White crystalline solid

**Solubility**: Soluble in water

**Color**: White

**Odor**: None

**Flash Point**: Not applicable

**Boiling Point**: Not applicable

**Density**: Not applicable

**Relative Density**: Not applicable

**Specific Gravity**: Not applicable

**Auto Ignition Temperature**: Not applicable

**Vapor Density**: Not applicable

**Vapor Pressure**: Not applicable

**Vapor Pressure at 20°C**: Not applicable

**Vapor Pressure at 100°C**: Not applicable

**Vapor Pressure at 25°C**: Not applicable

**Vapor Pressure at 30°C**: Not applicable

**Vapor Pressure at 40°C**: Not applicable

**Vapor Pressure at 50°C**: Not applicable

**Vapor Pressure at 60°C**: Not applicable

**Vapor Pressure at 70°C**: Not applicable

**Vapor Pressure at 80°C**: Not applicable

**Vapor Pressure at 90°C**: Not applicable

**Vapor Pressure at 100°C**: Not applicable

**Vapor Pressure at 110°C**: Not applicable

**Vapor Pressure at 120°C**: Not applicable

**Vapor Pressure at 130°C**: Not applicable

**Vapor Pressure at 140°C**: Not applicable

**Vapor Pressure at 150°C**: Not applicable

**Vapor Pressure at 160°C**: Not applicable

**Vapor Pressure at 170°C**: Not applicable

**Vapor Pressure at 180°C**: Not applicable

**Vapor Pressure at 190°C**: Not applicable

**Vapor Pressure at 200°C**: Not applicable

**Vapor Pressure at 210°C**: Not applicable

**Vapor Pressure at 220°C**: Not applicable

**Vapor Pressure at 230°C**: Not applicable

**Vapor Pressure at 240°C**: Not applicable

**Vapor Pressure at 250°C**: Not applicable

**Vapor Pressure at 260°C**: Not applicable

**Vapor Pressure at 270°C**: Not applicable

**Vapor Pressure at 280°C**: Not applicable

**Vapor Pressure at 290°C**: Not applicable

**Vapor Pressure at 300°C**: Not applicable

**Vapor Pressure at 310°C**: Not applicable

**Vapor Pressure at 320°C**: Not applicable

**Vapor Pressure at 330°C**: Not applicable

**Vapor Pressure at 340°C**: Not applicable

**Vapor Pressure at 350°C**: Not applicable

**Vapor Pressure at 360°C**: Not applicable

**Vapor Pressure at 370°C**: Not applicable

**Vapor Pressure at 380°C**: Not applicable

**Vapor Pressure at 390°C**: Not applicable

**Vapor Pressure at 400°C**: Not applicable

**Vapor Pressure at 410°C**: Not applicable

**Vapor Pressure at 420°C**: Not applicable

**Vapor Pressure at 430°C**: Not applicable

**Vapor Pressure at 440°C**: Not applicable

**Vapor Pressure at 450°C**: Not applicable

**Vapor Pressure at 460°C**: Not applicable

**Vapor Pressure at 470°C**: Not applicable

**Vapor Pressure at 480°C**: Not applicable

**Vapor Pressure at 490°C**: Not applicable

**Vapor Pressure at 500°C**: Not applicable

**Vapor Pressure at 510°C**: Not applicable

**Vapor Pressure at 520°C**: Not applicable

**Vapor Pressure at 530°C**: Not applicable

**Vapor Pressure at 540°C**: Not applicable

**Vapor Pressure at 550°C**: Not applicable

**Vapor Pressure at 560°C**: Not applicable

**Vapor Pressure at 570°C**: Not applicable

**Vapor Pressure at 580°C**: Not applicable

**Vapor Pressure at 590°C**: Not applicable

**Vapor Pressure at 600°C**: Not applicable

**Vapor Pressure at 610°C**: Not applicable

**Vapor Pressure at 620°C**: Not applicable

**Vapor Pressure at 630°C**: Not applicable

**Vapor Pressure at 640°C**: Not applicable

**Vapor Pressure at 650°C**: Not applicable

**Vapor Pressure at 660°C**: Not applicable

**Vapor Pressure at 670°C**: Not applicable

**Vapor Pressure at 680°C**: Not applicable

**Vapor Pressure at 690°C**: Not applicable

**Vapor Pressure at 700°C**: Not applicable

**Vapor Pressure at 710°C**: Not applic
<table>
<thead>
<tr>
<th>Exposure limits</th>
<th>ST</th>
<th>3 mg/m³</th>
<th>USA. NIOSH Recommended Exposure Limits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PEL</td>
<td>1 mg/m³</td>
<td>California permissible exposure limits for chemical contaminants (Title 8, Article 107)</td>
<td></td>
</tr>
<tr>
<td>STEL</td>
<td>3 mg/m³</td>
<td>California permissible exposure limits for chemical contaminants (Title 8, Article 107)</td>
<td></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)

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

**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)

Sigma-Aldrich - F9252
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>Chemical</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>Chemical</th>
<th>CAS-No.</th>
<th>Revision Date</th>
</tr>
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<tbody>
<tr>
<td>Hydrochloric acid</td>
<td>7647-01-0</td>
<td>1993-04-24</td>
</tr>
</tbody>
</table>
16. OTHER INFORMATION

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

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

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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