Section 1. Chemical Product and Company Identification

<table>
<thead>
<tr>
<th>Common Name/Trade Name</th>
<th>Sulfur Flour</th>
<th>Catalog Number(s)</th>
<th>S1714</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAS#</td>
<td>7704-34-9</td>
<td>RTECS</td>
<td>WS4250000</td>
</tr>
<tr>
<td>Manufacturer</td>
<td>SPECTRUM LABORATORY PRODUCTS INC.</td>
<td>14422 S. SAN PEDRO STREET</td>
<td>GARDENA, CA 90248</td>
</tr>
</tbody>
</table>

Section 2. Composition and Information on Ingredients

<table>
<thead>
<tr>
<th>Name</th>
<th>CAS #</th>
<th>TWA (mg/m³)</th>
<th>STEL (mg/m³)</th>
<th>CEIL (mg/m³)</th>
<th>% by Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Sulfur</td>
<td>7704-34-9</td>
<td></td>
<td></td>
<td></td>
<td>100</td>
</tr>
</tbody>
</table>

Toxicological Data on Ingredients

Sulfur Flour:

ORAL (LD50): Acute: >8437 mg/kg [Rat]. >3000 mg/kg [Rat]. >5000 mg/kg [Rat].

DERMAL (LD50): Acute: >2000 mg/kg [Rabbit].

DUST (LC50): Acute: >9.23 mg/l 4 hours [Rat].

Section 3. Hazards Identification

Potential Acute Health Effects

EMERGENCY OVERVIEW:

WARNING! MAY FORM COMBUSTIBLE DUST IN AIR (DURING PROCESSING)

Hazardous in case of eye contact (irritant). Slightly hazardous in case of skin contact (irritant), of ingestion, of inhalation (lung irritant).

Potential Chronic Health Effects

CARCINOGENIC EFFECTS: Not available.

MUTAGENIC EFFECTS: Not available.

TERATOGENIC EFFECTS: Not available.

DEVELOPMENTAL TOXICITY: Not available.

The substance may be toxic to lungs, upper respiratory tract, skin.

Repeated or prolonged exposure to the substance can produce target organs damage.

Continued on Next Page
### Section 4. First Aid Measures

<table>
<thead>
<tr>
<th>Skin Contact</th>
<th>In case of contact, immediately flush skin with plenty of water. Cover the irritated skin with an emollient. Remove contaminated clothing and shoes. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Serious Skin Contact</td>
<td>Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek medical attention.</td>
</tr>
<tr>
<td>Inhalation</td>
<td>If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.</td>
</tr>
<tr>
<td>Serious Inhalation</td>
<td>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. Seek medical attention.</td>
</tr>
<tr>
<td>Ingestion</td>
<td>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 if symptoms appear.</td>
</tr>
<tr>
<td>Serious Ingestion</td>
<td>Not available.</td>
</tr>
</tbody>
</table>

### Section 5. Fire and Explosion Data

<table>
<thead>
<tr>
<th>Flammability of the Product</th>
<th>Flammable.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Auto-Ignition Temperature</td>
<td>232°C (449.6°F)</td>
</tr>
<tr>
<td>Flash Points</td>
<td>CLOSED CUP: 207°C (404.6°F).</td>
</tr>
<tr>
<td>Flammable Limits</td>
<td>Not available.</td>
</tr>
<tr>
<td>Products of Combustion</td>
<td>Not available.</td>
</tr>
<tr>
<td>Fire Fighting Media and Instructions</td>
<td>Flammable solid. SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use water spray or fog. Cool containing vessels with water jet in order to prevent pressure build-up, autoignition or explosion.</td>
</tr>
<tr>
<td>Special Remarks on Fire Hazards</td>
<td>Vapors given off during melting of Sulfur may contain sufficient Hydrogen Sulfide and Carbon Disulfide to permit ignition of air/vapor mixture on contact with hot surface. Such ignition may result in transmission of flames to molten Sulfur. Mixture of Barium carbide and sulfur heated at 150 deg. C becomes incandescent. Mixture of barium chloride and Sulfur ignites at about 108-111 deg. C. Calcium carbide reacts incandescently with sulfur vapor at 500 deg. C. Calcium phosphide reacts with sulfur incandescently at 300 deg. C. Powdered sulfur is spontaneously flammable when mixed with Lampblack or freshly calcined charcoal. Sulfur in chlorine dioxide takes fire spontaneously and may produce an explosion. Flowers of sulfur moistened with chromyl chloride ignites spontaneously. A mixture of lead chloride and sulfur ignites at about 63-67 deg. C. A mixture of sulfur and silver chloride ignites at about 74 deg. C. When finely divided sulfur is ground with silver oxide, the mixture ignites. Solid sulfur will ignite when mixed with solid sodium chloride and moistened. Lithium carbide burns in vapors of sulfur. Sulfur mixed with mercurous oxide will ignite on light impact. Powdered nickel heated with sulfur reacts with incandescence. Sulfur when heated with Thorium reacts vigorously with incandescence. Mixture of sulfur + niobium oxide + aluminum causes fire. A mixture of boron and sulfur becomes incandescent 600 deg. C. Bromine trifluoride and sulfur react incandescently. Potassium nitride unites with sulfur when heated, forming a highly flammable mixture. Rubidium acetylene carbide ignites on contact with molten sulfur.</td>
</tr>
</tbody>
</table>
Sulfur Flour

Material in powder form, capable of creating a dust explosion. SULFUR IS POOR CONDUCTOR OF ELECTRICITY & TENDS TO DEVELOP CHARGES OF STATIC ELECTRICITY DURING TRANSPORT OR PROCESSING; STATIC DISCHARGE MAY LEAD TO IGNITION OF SULFUR DUST.

Special Remarks on Explosion Hazards

Avoid generating dust. Fine dust dispersed in air in sufficient concentrations, and in the presence of an ignition source is a potential dust explosion hazard.
- Sulfur + Ammonia may form explosive Sulfur Nitride.
- Ammonium Nitrate + Sulfur can be exploded by shock.
- Mixtures of Ammonium Perchlorate and Sulfur are impact sensitive.
- Interaction between Sulfur and Tetraphenyllead may be explosive.
- A mixture of sulfur + stannic iodide + sodium produces a strong explosion on impact.
- When sulfur is rubbed with sodium the reaction proceeds with explosive violence.
- When a mixture of Sulfur and yellow phosphorous is warmed is causes a vivid combustion and powerful explosion.
- Iodine Pentaoxide reacts explosively when warmed with sulfur.
- Potassium Perchlorate + Sulfur , used in flashcrackers, can be explodes by moderately strong impact.
- COMBINATION OF FINELY DIVIDED SULFUR & FINELY DIVIDED BROMATES (ALSO CHLORATES OR IODATES) OF BARIUM, CALCIUM,MAGNESIUM, POTASSIUM, SODIUM, OR ZINC WILL EXPLODE WITH HEAT, PERCUSSION, & SOMETIMES, LIGHT FRICITION.
- A mixture of sulfur and chlorates will explode.
- Sulfur + silver bromate produces an explosive reaction in the presence of water.

Section 6. Accidental Release Measures

Small Spill

Use appropriate tools to put the spilled solid in a convenient waste disposal container.

Large Spill

- Flammable solid.
- Stop leak if without risk. Do not touch spilled material. Use water spray curtain to divert vapor drift. Prevent entry into sewers, basements or confined areas; dike if needed. Eliminate all ignition sources. Call for assistance on disposal.
- Dust deposits should not be allowed to accumulate on surfaces, as these may form an explosive mixture if they are released into the atmosphere in sufficient concentration.
- Avoid dispersal of dust in the air(i.e clearing dust surfaces with compressed air)
- Non-sparking tools should be used.

Section 7. Handling and Storage

Precautions

Keep away from heat. Keep away from sources of ignition. Minimize dust generation and accumulation. Routine housekeeping should be instituted to ensure that dusts do not accumulate on surfaces. Dry powders can build static electricity charges when subjected to friction of transfer and mixing operations. 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, metals.

Storage

Keep container in a cool, well-ventilated area. Keep container tightly closed and sealed until ready for use. Avoid all possible sources of ignition (spark or flame). Sensitive to light. Store in light-resistant containers.

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.
- It is recommended that all dust control equipment such as exhaust ventilation and material transport systems involved in the handling of this product contain explosion relief vents or an explosion suppression system or an oxygen-deficient environment.
- Ensure that dust-handling systems (such as ducts, dust collectors, vessels, and processing equipment) are designed in a manner to prevent the escape of dust into the work area (i.e. that there is no leakage from the equipment).

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: 10 (mg/m³) [Canada] Inhalation

Consult local authorities for acceptable exposure limits.

Continued on Next Page
### Section 9. Physical and Chemical Properties

<table>
<thead>
<tr>
<th>Physical state and appearance</th>
<th>Solid. (Powdered solid.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Odor</td>
<td>Odorless. Pure Sulfur is odorless, but traces of hydrocarbon impurity may impart an oily and/or rotten egg odor.</td>
</tr>
<tr>
<td>Taste</td>
<td>Tasteless. Faint taste</td>
</tr>
<tr>
<td>Color</td>
<td>Yellow.</td>
</tr>
<tr>
<td>Molecular Weight</td>
<td>32.06 g/mole</td>
</tr>
<tr>
<td>pH (1% soln/water)</td>
<td>Not applicable.</td>
</tr>
<tr>
<td>Boiling Point</td>
<td>445°C (833°F)</td>
</tr>
<tr>
<td>Melting Point</td>
<td>112°C (233.6°F) - 120°C</td>
</tr>
<tr>
<td>Critical Temperature</td>
<td>1040°C (1904°F)</td>
</tr>
<tr>
<td>Specific Gravity</td>
<td>Density: 2.07 (Water = 1)</td>
</tr>
<tr>
<td>Vapor Pressure</td>
<td>Not applicable.</td>
</tr>
<tr>
<td>Vapor Density</td>
<td>Not available.</td>
</tr>
<tr>
<td>Volatility</td>
<td>Not available.</td>
</tr>
<tr>
<td>Odor Threshold</td>
<td>Not available.</td>
</tr>
<tr>
<td>Water/Oil Dist. Coeff.</td>
<td>Not available.</td>
</tr>
<tr>
<td>Ionicity (in Water)</td>
<td>Not available.</td>
</tr>
<tr>
<td>Dispersion Properties</td>
<td>See solubility in water, acetone.</td>
</tr>
<tr>
<td>Solubility</td>
<td>Partially soluble in acetone. Very slightly soluble in diethyl ether. Insoluble in cold water, hot water. Sparingly soluble in alcohol. Soluble in toluene. Solubility in acetone: 2.65% @ 25 deg. C. Solubility in methylene iodide: 9.1% @ 10 deg. C. Solubility in chloroform: 1.5% @ 18 deg. C.</td>
</tr>
</tbody>
</table>

### Section 10. Stability and Reactivity Data

<table>
<thead>
<tr>
<th>Stability</th>
<th>The product is stable.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Instability Temperature</td>
<td>Not available.</td>
</tr>
<tr>
<td>Conditions of Instability</td>
<td>Heat, ignition sources, incompatible materials</td>
</tr>
<tr>
<td>Incompatibility with various substances</td>
<td>Reactive with oxidizing agents, metals.</td>
</tr>
<tr>
<td>Corrosivity</td>
<td>Non-corrosive in presence of glass.</td>
</tr>
<tr>
<td>Special Remarks on Reactivity</td>
<td>Incompatible with ammonia, ammonium nitrate, ammonium perchlorate, barium carbide, barium chloride, calcium phosphide, calcium carbide, lampblack, freshly calcined charcoal, lead chlorate, finely divided bromates (also chlorates, or iodates) of Barium, Magnesium, Calcium, Potassium, Sodium, or Zinc, Calcium Hypochlorite, Silver Bromate, Lithium Carbide, Lead Dioxide, Potassium Chlorate, Sodium Hydride, Thorium, aluminium + niobium oxide, bromine pentfluoride, boron, bromine trifluoride, calcium, chlorine monoxide gas, chlorine trifluoride, iodine, iodine pentaoxide, Lithium, Nitrogen dioxide, yellow phosphorous, Potassium Nitride, Uranium, Tetraphenylead.</td>
</tr>
<tr>
<td>Special Remarks on Corrosivity</td>
<td>Not available.</td>
</tr>
<tr>
<td>Polymerization</td>
<td>Will not occur.</td>
</tr>
</tbody>
</table>
### Section 11. Toxicological Information

#### Routes of Entry

- Inhalation
- Ingestion

#### Toxicity to Animals

**WARNING:** THE LC50 VALUES HEREUNDER ARE ESTIMATED ON THE BASIS OF A 4-HOUR EXPOSURE.

- Acute oral toxicity (LD50): >3000 mg/kg [Rat]. >5000 mg/kg [Rat]. >8437 mg/kg [Rat]
- Acute dermal toxicity (LD50): >2000 mg/kg [Rabbit].
- Acute toxicity of the dust (LC50): >9.23 mg/l 4 hours [Rat].

#### Chronic Effects on Humans

- May cause damage to the following organs: upper respiratory tract, skin.

#### Other Toxic Effects on Humans

- Slightly hazardous in case of inhalation (lung irritant).
- Slightly hazardous in case of skin contact (irritant), of ingestion.

#### Special Remarks on Toxicity to Animals

- Lowest Published Lethal Dose:
- LDL [Rabbit] - Route: Oral; Dose: 175 mg/kg.

#### Special Remarks on Chronic Effects on Humans

- Not available.

#### Special Remarks on other Toxic Effects on Humans

- Acute Potential Health Effects:
  - Skin: May cause skin irritation or rash.
  - Eyes: May cause eye irritation with tearing, burning, scratchy discomfort, and blurring of vision, and possible eye damage (damage to the lens, formation of opacities, cataracts, and focal chorioretinitis).
  - Inhalation: Breathing sulfur can irritate the nose, throat, lungs, causing coughing, wheezing, sneezing, and/or shortness of breath/dyspnea. It may cause inflammation in the respiratory tract resulting in tracheobronchitis, inflammation of nasal mucosa with increased secretions, pulmonary edema, pneumonia.
  - Ingestion: May cause gastrointestinal tract irritation with nausea, vomiting, and diarrhea. Sulfur is not particularly toxic when ingested. Ingestion of 60 grams has been survived. However, if not promptly eliminated, theoretically, ingestion of large doses may lead to hydrogen sulfide production in chiefly due to bacterial action in the colon. Small particles are more toxic than large ones. It may affect behavior/central nervous system/peripheral nervous system (headache, vertigo, amnesia, fatigue, seizures, agitation, peripheral neuropathy, coma), and kidneys.

#### Chronic Potential Health Effects:

- Skin: Prolonged or repeated skin contact may cause allergic contact dermatitis, which is rare.
- Ingestion: Prolonged or repeated ingestion may cause metabolic acidosis. It may also affect the liver (increase levels of liver enzymes)
- Inhalation: Prolonged or repeated inhalation may cause bronchitis, various bronchopulmonary diseases, including emphysema, bronchiectasis, thiopneumoconiosis (sulfur pneuomoconiosis), and asthma. It may also causes changes in the thyroid gland.

### Section 12. Ecological Information

#### Ecotoxicity

| Ecotoxicity in water (LC50): | 10000 ppm 96 hours [Fish (Mosquito fish)] | 866 mg/l 96 hours [Fish (Brachydanio rerio (Zebra fish))] | >180 mg/l 96 hours [Fish (Oncorhynchus mykiss (rainbow trout))] | >180 mg/l 96 hours [Fish (Lepomis macrochirus (Blue gill))] | <14 mg/l 96 hours [Fish (Lepomis macrochirus (Blue gill))] |

#### 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 product itself and its products of degradation are not toxic.

#### 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.

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**Continued on Next Page**
## Section 14. Transport Information

<table>
<thead>
<tr>
<th>DOT Classification</th>
<th>For Domestic Shipping in Bulk quantities CLASS 9. (DOT regulation for Domestic shipping only applies only to bulk quantities as defined in 49CFR. See note under &quot;Special Provisions for Transport&quot;)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Special Provisions for Transport</td>
<td>Note that Sulfur which is transported domestically is not subject to the requirements of 49CFR Hazardous Materials Guidelines if transported in non-bulk packaging (quantities). Refer to 49CFR 172.102 (c) (1) special provision #30. and definition of &quot;Bulk&quot; quantities in 49CFR171.8. Spectrum Laboratory Products does not ship this material domestically in bulk quantities as defined in 49CFR. Therefore, shipment of this materials by Spectrum is not DOT regulated per special provision.</td>
</tr>
</tbody>
</table>

### DOT (Pictograms)

![DOT Pictogram](image)

## Section 15. Other Regulatory Information and Pictograms

### Federal and State Regulations
- Pennsylvania RTK: Sulfur
- Massachusetts RTK: Sulfur
- New Jersey: Sulfur
- California Director's List of Hazardous Substances: Sulfur
- TSCA 8(b) inventory: Sulfur

### California Proposition 65
- 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 Regulators
- EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances (EINECS No. 231-722-6).
- Canada: Listed on Canadian Domestic Substance List (DSL).
- China: Listed on National Inventory.
- Japan: Not listed on National Inventory (ENCS).
- Korea: Listed on National Inventory (KECI).
- Philippines: Listed on National Inventory (PICCS).
- Australia: Listed on AICS.

### Other Classifications
- **WHMIS (Canada)**
  - CLASS B-4: Flammable solid.
- **DSCL (EEC)**
  - R38- Irritating to skin.
  - S46- If swallowed, seek medical advice immediately and show this container or label.

### WHMIS (Canada) (Pictograms)

![WHMIS Pictogram](image)

### HMIS (U.S.A.)
- Health Hazard: 2
- Fire Hazard: 2
- Reactivity: 0
- Personal Protection: E

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

![National Fire Protection Association Pictogram](image)

### WHMIS (Canada) (Pictograms)

![WHMIS Pictogram](image)

### DSCL (Europe) (Pictograms)

![DSCL Pictogram](image)

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[Continued on Next Page]
Protective Equipment

Gloves.
Lab coat.
Dust respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate.
Splash goggles.

Section 16. Other Information

MSDS Code
S5275

References
Refer to NFPA 654, Standard for the Prevention of Fire and Dust Explosions from the Manufacturing, Processing, and Handling of Combustible Particulate Solids, for safe handling.

Other Special Considerations
Major Uses: In manufacturing sulfuric acid, carbon disulfide, sulfites, insecticides, plastics, enamels, metal-glass cements; in vulcanizing rubber; in syntheses of dyes; in making gunpowder, matches; for bleaching wood pulp, straw, wool, silk, felt, linen; in making phosphatic fertilizers; bleaching of dried fruits; fungicide and acaricide; rodent repellent; soil conditioner; nucleating reagent for photographic film; used in cosmetics, such as acne ointments and lotions, and in antidandruff shampoos.

Validated by Sonia Owen on 6/7/2013.
Verified by Sonia Owen.

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.