1. Identification

Product identifier: Sulfur

Other means of identification:
- SDS number: 602-Solid-GHS
- Synonyms: Sulfur, Prilled Sulfur, Powdered Sulfur. See section 16 for complete information.

Recommended use: Refinery feedstock.

Recommended restrictions: None known.

Manufacturer/Importer/Supplier/Distributor information
- Manufacturer/Supplier: Valero Marketing & Supply Company and Affiliates
  One Valero Way
  San Antonio, TX 78269-6000
- General Assistance: 210-345-4593
- E-Mail: CorpHSE@valero.com
- Contact Person: Industrial Hygienist
- Emergency Telephone: 24 Hour Emergency 866-565-5220
  1-800-424-9300 (CHEMTREC USA)

2. Hazard(s) identification

Physical hazards: Not classified.

Health hazards:
- Skin corrosion/irritation: Category 2
- Specific target organ toxicity, single exposure: Category 3 respiratory tract irritation

OSHA defined hazards: Combustible dust

Label elements

Signal word: Warning

Hazard statement: Causes skin irritation. Causes eye irritation. May cause respiratory irritation. May form combustible dust concentrations in air.

Precautionary statement

Prevention: Avoid breathing dust. Use only outdoors or in a well-ventilated area. Wash thoroughly after handling. Wear protective gloves.

Response: If inhaled: Remove person to fresh air and keep comfortable for breathing. Call a poison center/doctor if you feel unwell. If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical advice/attention. If on skin: Wash with plenty of water. If skin irritation occurs: Get medical advice/attention. Take off contaminated clothing and wash before re-use.

Storage: Store in a well-ventilated place. Keep container tightly closed. Store locked up.

Disposal: Dispose of contents/container in accordance with local/regional/national/international regulations.

Hazard(s) not otherwise classified (HNOC): None known.

Supplemental information: None.

3. Composition/information on ingredients

Substances

Sulfur
4. First-aid measures

Inhalation
If symptomatic, move to fresh air. Get medical attention if symptoms persist.

Skin contact
Remove contaminated clothing and shoes. Wash off immediately with soap and plenty of water. Get medical attention if irritation develops or persists. Wash clothing separately before reuse. Destroy or thoroughly clean contaminated shoes.

Eye contact
Immediately flush eyes with plenty of water for at least 15 minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Get medical attention.

Ingestion
Rinse mouth thoroughly. Do not induce vomiting without advice from poison control center. Do not give mouth-to-mouth resuscitation. If vomiting occurs, keep head low so that stomach content does not get into the lungs. Never give anything by mouth to a victim who is unconscious or is having convulsions. Get medical attention immediately.

Most important symptoms/effects, acute and delayed
Irritation. Persons with pre-existing respiratory tract, skin and lung (such as asthma) disorders may be aggravated by exposure to this product.

Indication of immediate medical attention and special treatment needed
In case of shortness of breath, give oxygen. Keep victim warm. Keep victim under observation. Symptoms may be delayed.

General information
If exposed or concerned: get medical attention/advice. Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves. Show this safety data sheet to the doctor in attendance. Wash contaminated clothing before re-use.

5. Fire-fighting measures

Suitable extinguishing media

Unsuitable extinguishing media
Do not use a solid water stream as it may scatter and spread fire.

Specific hazards arising from the chemical
Explosion hazard: 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.

Special protective equipment and precautions for firefighters
Wear full protective clothing, including helmet, self-contained positive pressure or pressure demand breathing apparatus, protective clothing and face mask.

Fire fighting equipment/instructions
Wear full protective clothing, including helmet, self-contained positive pressure or pressure demand breathing apparatus, protective clothing and face mask. Fight fire from maximum distance or use unmanned hose holders or monitor nozzles. Move containers from fire area if you can do it without risk. In the event of fire, cool tanks with water spray.

6. Accidental release measures

Personal precautions, protective equipment and emergency procedures
Keep unnecessary personnel away. Local authorities should be advised if significant spills cannot be contained. Keep upwind. Keep out of low areas. Ventilate closed spaces before entering. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. See Section 8 of the SDS for Personal Protective Equipment.

Methods and materials for containment and cleaning up
ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area). Extinguish all flames in the vicinity. Keep combustibles (wood, paper, oil, etc.) away from spilled material.

Large Spills: Stop the flow of material, if this is without risk.

Small Spills: Sweep or shovel up material and place in a clearly labeled container for waste. Following product recovery, flush area with water. Prevent product from entering drains. Do not allow material to contaminate ground water system. Clean surface thoroughly to remove residual contamination.
If facility or operation has an "oil or hazardous substance contingency plan", activate its procedures. Stay upwind and away from spill. Wear appropriate protective equipment including respiratory protection as conditions warrant. Do not enter or stay in area unless monitoring indicates that it is safe to do so. Isolate hazard area and restrict entry to emergency crew. Combustible dust. Review Firefighting Measures, Section 5, before proceeding with clean up. Keep all sources of ignition (flames, smoking, flares, etc.) and hot surfaces away from release. Contain spill in smallest possible area. Recover as much product as possible (e.g. by vacuuming). Stop leak if it can be done without risk. Spilled material may be absorbed by an appropriate absorbent, and then handled in accordance with environmental regulations. Prevent spilled material from entering sewers, storm drains, other unauthorized treatment or drainage systems and natural waterways. Contact fire authorities and appropriate federal, state and local agencies. If spill of any amount is made into or upon navigable waters, the contiguous zone, or adjoining shorelines, contact the National Response Center at 1-800-424-8802. For highway or railways spills, contact Chemtrec at 1-800-424-9300.

**Environmental precautions**

**7. Handling and storage**

**Precautions for safe handling**

Wear personal protective equipment. Avoid breathing dust. Avoid contact with eyes, skin, and clothing. Do not taste or swallow. Avoid prolonged exposure. Use only with adequate ventilation. Wash thoroughly after handling. Do not handle or store near an open flame, heat or other sources of ignition. Take precautionary measures against static discharges. All equipment used when handling the product must be grounded. Use non-sparking tools and explosion-proof equipment. When using, do not eat, drink or smoke. Avoid release to the environment. In the United States of America, refer to NFPA® Pamphlet No. 654, Prevention of Fire and Dust Explosions in the Chemical, Dye, Pharmaceutical, and Plastics Industries.

**Conditions for safe storage, including any incompatibilities**

Routine housekeeping should be instituted to ensure that dusts do not accumulate on surfaces. Dry powders can build static electricity charges when subjected to the friction of transfer and mixing operations. Provide adequate precautions, such as electrical grounding and bonding, or inert atmospheres. 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. Do not handle or store near an open flame, heat or other sources of ignition. Keep container tightly closed in a cool, well-ventilated place. Keep away from food, drink and animal feedingstuffs. Keep out of the reach of children.

**8. Exposure controls/personal protection**

**Occupational exposure limits**

No exposure limits noted for ingredient(s).

**Biological limit values**

No biological exposure limits noted for the ingredient(s).

**Exposure guidelines**

No exposure standards allocated.

**Appropriate engineering controls**

Provide adequate general and local exhaust ventilation. Use process enclosures, local exhaust ventilation, or other engineering controls to control airborne levels below recommended exposure limits. It is recommended that all dust control equipment such as local exhaust ventilation and material transport systems involved in 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 exhaust ducts, dust collectors, vessels, and processing equipment) are designed in a manner to prevent the escape of dust into the work area (i.e., there is no leakage from the equipment). Use only appropriately classified electrical equipment and powered industrial trucks.

**Individual protection measures, such as personal protective equipment**

**Eye/face protection**

Safety glasses.

**Skin protection**

**Hand protection**

Wear protective gloves.

**Skin protection**

**Other**

Wear chemical-resistant, impervious gloves. Full body suit and boots are recommended when handling large volumes or in emergency situations. Flame retardant protective clothing is recommended.

**Respiratory protection**

Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator. If workplace exposure limits for product or components are exceeded, NIOSH approved equipment should be worn. Proper respirator selection should be determined by adequately trained personnel, based on the contaminants, the degree of potential exposure and published respiratory protection factors. This equipment should be available for nonroutine and emergency use.

**Thermal hazards**

When material is heated, wear gloves to protect against thermal burns.
Consult supervisor for special handling instructions. Do not breathe dust. Keep away from food and drink. Wash hands before breaks and immediately after handling the product. Provide eyewash station and safety shower. Handle in accordance with good industrial hygiene and safety practice.

9. Physical and chemical properties

Appearance
Yellow solid.

Physical state
Solid.

Form
Solid prills.

Color
Yellow.

Odor
Sulfurous.

Odor threshold
Not available.

pH
Not available.

Melting point/freezing point
235.04 - 248 °F (112.8 - 120 °C)
246.2 °F (119 °C)

Initial boiling point and boiling range
832.28 °F (444.6 °C)

Flash point
405.0 °F (207.2 °C) Closed Cup
404.3 °F (206.9 °C)

Evaporation rate
Not applicable.

Flammability (solid, gas)
Combustible dust.

Upper/lower flammability or explosive limits
Flammability limit - lower (%)
35 g/m3

Flammability limit - upper (%)
1400 g/m3

Explosive limit - lower (%)
Not available.

Explosive limit - upper (%)
Not available.

Vapor pressure
Not applicable.

Vapor density
Not applicable.

Relative density
Not available.

Solubility(ies)
Solubility (water)
Very slightly soluble.

Partition coefficient (n-octanol/water)
No data available.

Auto-ignition temperature
449.33 °F (231.85 °C)
450 °F (232.22 °C)

Decomposition temperature
Not available.

Viscosity
Not applicable.

Other information
Density
1.80 g/cm3
2.07 g/cm3

Dynamic viscosity
11.13 mPa.s

Dynamic viscosity temperature
251 °F (121.67 °C)

Kinematic viscosity
6.183 mm²/s estimated

Molecular formula
S

Molecular weight
32.06 g/mol

10. Stability and reactivity

Reactivity
Not available.

Chemical stability
Stable under normal temperature conditions and recommended use.
Possibility of hazardous reactions
Hazardous polymerization does not occur.

Conditions to avoid
Heat. Ignition sources. Minimize dust generation and accumulation.

Incompatible materials
Strong oxidizing agents.

Hazardous decomposition products
No hazardous decomposition products are known.

11. Toxicological information

Information on likely routes of exposure

- Inhalation: May cause respiratory tract irritation.
- Skin contact: Causes skin irritation.
- Eye contact: Causes eye irritation.
- Ingestion: Ingestion may cause irritation and malaise.

Symptoms related to the physical, chemical and toxicological characteristics
Irritation.

Information on toxicological effects

- Acute toxicity: Causes skin, eye and respiratory tract irritation.
- Skin corrosion/irritation: Causes skin irritation.
- Serious eye damage/eye irritation: Causes eye irritation.

Respiratory or skin sensitization

- Respiratory sensitization: Not classified.
- Skin sensitization: Not classified.
- Germ cell mutagenicity: Not classified.
- Carcinogenicity: Not classified.

IARC Monographs. Overall Evaluation of Carcinogenicity
Not listed.

NTP Report on Carcinogens
Not listed.

OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)
Not regulated.

Reproductive toxicity
Not classified.

Specific target organ toxicity - single exposure
May cause respiratory irritation.

Specific target organ toxicity - repeated exposure
Not classified.

Aspiration hazard
Not applicable.

12. Ecological information

Ecotoxicity
Not expected to be harmful to aquatic organisms.

Persistence and degradability
No data available.

Bioaccumulative potential
No data available.

Mobility in soil
Not available.

Other adverse effects
Not available.

13. Disposal considerations

Disposal instructions
Dispose in accordance with all applicable regulations. Do not allow this material to drain into sewers/water supplies. Do not contaminate ponds, waterways or ditches with chemical or used container.

Local disposal regulations
Dispose of in accordance with local regulations.

Hazardous waste code
Not assigned.

Waste from residues / unused products
Dispose in accordance with all applicable regulations.
Since emptied containers may retain product residue, follow label warnings even after container is emptied. Offer rinsed packaging material to local recycling facilities.

14. Transport information

DOT

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IMDG

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| Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code | Not applicable. This product is a solid. Therefore, bulk transport is governed by IMSBC code.

15. Regulatory information

US federal regulations

This product is a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard 29 CFR 1910.1200 (OSHA) and 8 CCR § 5194 (Cal/OSHA).

All components are on the U.S. EPA TSCA Inventory List.

TSCA Section 12(b) Export Notification (40 CFR 707, Subpt. D)

Not regulated.

OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)

Not regulated.

CERCLA Hazardous Substance List (40 CFR 302.4)

Not listed.

Superfund Amendments and Reauthorization Act of 1986 (SARA)

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<th>Hazard categories</th>
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<td>Immediate Hazard</td>
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<tr>
<td>Delayed Hazard</td>
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<td>Fire Hazard</td>
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<tr>
<td>Pressure Hazard</td>
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<tr>
<td>Reactivity Hazard</td>
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</table>

SARA 302 Extremely hazardous substance

Not listed.
SARA 311/312 Hazardous chemical
Yes
SARA 313 (TRI reporting)
Not regulated.

Other federal regulations
Clean Air Act (CAA) Section 112 Hazardous Air Pollutants (HAPs) List
Not regulated.
Clean Air Act (CAA) Section 112(r) Accidental Release Prevention (40 CFR 68.130)
Not regulated.
Safe Drinking Water Act (SDWA)
Not regulated.

US state regulations
This product does not contain a chemical known to the State of California to cause cancer, birth defects or other reproductive harm.
US. Massachusetts RTK - Substance List
Sulfur (CAS 7704-34-9)
US. New Jersey Worker and Community Right-to-Know Act
Sulfur (CAS 7704-34-9)
US. Pennsylvania Worker and Community Right-to-Know Law
Sulfur (CAS 7704-34-9)
US. Rhode Island RTK
Not regulated.
US. California Proposition 65
Not Listed.

International Inventories
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<th>Country(s) or region</th>
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<td>Australia</td>
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<td>Canada</td>
<td>Domestic Substances List (DSL)</td>
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<td>Canada</td>
<td>Non-Domestic Substances List (NDSL)</td>
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<td>China</td>
<td>Inventory of Existing Chemical Substances in China (IECSC)</td>
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<tr>
<td>Europe</td>
<td>European Inventory of Existing Commercial Chemical Substances (EINECS)</td>
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<td>Europe</td>
<td>European List of Notified Chemical Substances (ELINCS)</td>
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<td>Japan</td>
<td>Inventory of Existing and New Chemical Substances (ENCS)</td>
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<td>Existing Chemicals List (ECL)</td>
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<tr>
<td>United States &amp; Puerto Rico</td>
<td>Toxic Substances Control Act (TSCA) Inventory</td>
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*A “Yes” indicates this product complies with the inventory requirements administered by the governing country(s). A “No” indicates that one or more components of the product are not listed or exempt from listing on the inventory administered by the governing country(s).

16. Other information, including date of preparation or last revision
Issue date: 12-February-2013
Revision date: 16-October-2015
Version #: 04

NFPA ratings
1
2
3
4
Disclaimer

This material Safety Data Sheet (SDS) was prepared in accordance with 29 CFR 1910.1200 by Valero Marketing & Supply Co., ("VALERO"). VALERO does not assume any liability arising out of product use by others. The information, recommendations, and suggestions presented in this SDS are based upon test results and data believed to be reliable. The end user of the product has the responsibility for evaluating the adequacy of the data under the conditions of use, determining the safety, toxicity and suitability of the product under these conditions, and obtaining additional or clarifying information where uncertainty exists. No guarantee expressed or implied is made as to the effects of such use, the results to be obtained, or the safety and toxicity of the product in any specific application. Furthermore, the information herein is not represented as absolutely complete, since it is not practicable to provide all the scientific and study information in the format of this document, plus additional information may be necessary under exceptional conditions of use, or because of applicable laws or government regulations.