1. Identification

Product identifier: Sulfur, Molten

Other means of identification:
- SDS number: 602-GHS
- Synonyms: Sulfur - Molten, Molten 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: Flammable solids Category 2

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

Environmental hazards:
- Hazardous to the aquatic environment, acute hazard Category 3
- Hazardous to the aquatic environment, long-term hazard Category 3

OSHA defined hazards: Not classified.

Label elements

Signal word: Danger


Precautionary statement

Prevention:

Response:
In case of fire: Use foam, carbon dioxide, dry powder or water fog for extinction. If inhaled: Remove person to fresh air and keep comfortable for breathing. Call a poison center/doctor. 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.
3. Composition/information on ingredients

Mixtures

<table>
<thead>
<tr>
<th>Chemical name</th>
<th>CAS number</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sulfur</td>
<td>7704-34-9</td>
<td>99 - 100</td>
</tr>
<tr>
<td>Hydrogen sulfide</td>
<td>7783-06-4</td>
<td>0 - 1</td>
</tr>
</tbody>
</table>

4. First-aid measures

**Inhalation**
Move to fresh air. If breathing is difficult, give oxygen. If not breathing, give artificial respiration. Get medical attention.

**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.
If burned by contact with hot material, cool molten material adhering to skin as quickly as possible with water, and see a physician for removal of adhering material and treatment of burn.

**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. If molten material contacts the eye, immediately flush with plenty of water for at least 15 minutes. Get medical attention immediately.

**Ingestion**
Molten material will produce thermal burns. Causes skin, eye and respiratory tract irritation.
Persons with pre-existing respiratory tract, skin and lung (such as asthma) disorders may be aggravated by exposure to this product. Hydrogen sulfide, a highly toxic gas, may be present.
Signs and symptoms of overexposure to hydrogen sulfide include respiratory and eye irritation, dizziness, nausea, coughing, a sensation of dryness and pain in the nose, and loss of consciousness. Odor does not provide a reliable indicator of the presence of hazardous levels in the atmosphere.

**Most important symptoms/effects, acute and delayed**
Burns should be treated as thermal burns.
In case of shortness of breath, give oxygen. Keep victim warm. Keep victim under observation.
Symptoms may be delayed.

**Indication of immediate medical attention and special treatment needed**
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.

**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**
Contact with molten material may cause thermal burns.

**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. Dike spill for later disposal.

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.

Environmental precautions

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.

7. Handling and storage

Precautions for safe handling

Wear personal protective equipment. Do not breathe dust or vapor. Do not get in eyes, on skin, on clothing. Do not taste or swallow. Avoid prolonged exposure. Use only with adequate ventilation. Wash thoroughly after handling. DO NOT handle, store or open near an open flame, sources of heat or sources of ignition. Protect material from direct sunlight. 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.

Conditions for safe storage, including any incompatibilities

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

US. OSHA Table Z-2 (29 CFR 1910.1000)

<table>
<thead>
<tr>
<th>Components</th>
<th>Type</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydrogen sulfide (CAS 7783-06-4)</td>
<td>Ceiling</td>
<td>20 ppm</td>
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</tbody>
</table>

ACGIH

<table>
<thead>
<tr>
<th>Material</th>
<th>Type</th>
<th>Value</th>
<th>Form</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sulfur, Molten (CAS Mixture)</td>
<td>TWA</td>
<td>0.5 mg/m3</td>
<td>(total dust)</td>
</tr>
</tbody>
</table>

US. ACGIH Threshold Limit Values

<table>
<thead>
<tr>
<th>Components</th>
<th>Type</th>
<th>Value</th>
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</thead>
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<td>Hydrogen sulfide (CAS 7783-06-4)</td>
<td>STEL</td>
<td>5 ppm</td>
</tr>
<tr>
<td></td>
<td>TWA</td>
<td>1 ppm</td>
</tr>
</tbody>
</table>

US. NIOSH: Pocket Guide to Chemical Hazards

<table>
<thead>
<tr>
<th>Components</th>
<th>Type</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydrogen sulfide (CAS 7783-06-4)</td>
<td>Ceiling</td>
<td>15 mg/m3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>10 ppm</td>
</tr>
</tbody>
</table>

Biological limit values

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

Exposure guidelines

No exposure standards allocated.
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. Wear a face shield when working with molten material.

**Skin protection**
- Wear protective gloves. When material is heated, wear gloves to protect against thermal burns.

**Hand protection**
- Wear chemical-resistant, impervious gloves. Full body suit and boots are recommended when handling large volumes or in emergency situations. Heat resistant/insulated gloves and clothing are recommended when working with molten material.

**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.

**General hygiene considerations**
- 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, Liquid.

**Form** Molten solid.

**Color** Yellow.

**Odor** Sulfurous.

**Odor threshold** Not available.

**pH** Not available.

**Melting point/freezing point** 246.2 °F (119 °C)

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

**Flash point** 404.3 °F (206.9 °C)

**Evaporation rate** Not applicable.

**Flammability (solid, gas)** Flammable solid.

**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)
Decomposition temperature  Not available.
Viscosity  Not applicable.

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. Keep away from combustible material.
Incompatible materials  Strong oxidizing agents.
Hazardous decomposition products  Sulfur oxides. Hydrogen sulfide.

11. Toxicological information
Information on likely routes of exposure
Inhalation  Toxic if inhaled. May cause respiratory tract irritation.
Skin contact  Molten material will produce thermal burns. Causes skin irritation.
Eye contact  Molten material will produce thermal burns. Causes eye irritation.
Ingestion  Molten material will produce thermal burns. Ingestion may cause irritation and malaise.
Symptoms related to the physical, chemical and toxicological characteristics  Contact with molten material may cause thermal burns. Causes skin, eye and respiratory tract irritation. Signs and symptoms of overexposure to hydrogen sulfide include respiratory and eye irritation, dizziness, nausea, coughing, a sensation of dryness and pain in the nose, and loss of consciousness.

Information on toxicological effects
Acute toxicity  Molten material will produce thermal burns. Toxic if inhaled. 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  Not classified.
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.

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  Harmful to aquatic organisms, may cause long-term adverse effects in the aquatic environment due to trace amounts of Hydrogen Sulfide(H2S).
Persistence and degradability  No data available.
Bioaccumulative potential  No data 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.

Contaminated packaging
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
- UN number: NA2448
- UN proper shipping name: Sulfur, molten
- Transport hazard class(es):
  - Class: 9
  - Subsidiary risk: -
  - Label(s): 9
- Packing group: III
- Special precautions for user: Not available.
- Special provisions: 30, IB3, T1, TP3
- Packaging exceptions: None
- Packaging non bulk: 213
- Packaging bulk: 247

IATA
- UN number: UN2448
- UN proper shipping name: Sulphur, molten
- Transport hazard class(es):
  - Class: 4.1
  - Subsidiary risk: -
- Packing group: Not available.
- Environmental hazards: No.
- ERG Code: 3L
- Special precautions for user: Not available.

IMDG
- UN number: UN2448
- UN proper shipping name: SULPHUR, MOLTEN
- Transport hazard class(es):
  - Class: 4.1
  - Subsidiary risk: -
- Packing group: III
- Environmental hazards: No.
- Marine pollutant: No.
- EmS: F-A, S-H
- Special precautions for user: Not available.
- Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code:
  - This product is a liquid and when transported in bulk is covered under MARPOL 73/78 Annex II.
  - This product is listed in the IBC Code.
  - Ship type: 3
  - Pollution category: Z

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)
Hydrogen sulfide (CAS 7783-06-4) LISTED

Superfund Amendments and Reauthorization Act of 1986 (SARA)

Hazard categories
- Immediate Hazard - Yes
- Delayed Hazard - No
- Fire Hazard - Yes
- Pressure Hazard - No
- Reactivity Hazard - No

SARA 302 Extremely hazardous substance

<table>
<thead>
<tr>
<th>Chemical name</th>
<th>CAS number</th>
<th>Reportable quantity (pounds)</th>
<th>Threshold planning quantity (pounds)</th>
<th>Threshold planning quantity, lower value (pounds)</th>
<th>Threshold planning quantity, upper value (pounds)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydrogen sulfide</td>
<td>7783-06-4</td>
<td>100</td>
<td>500</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

SARA 311/312 Hazardous chemical

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)
Hydrogen sulfide (CAS 7783-06-4)
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.

United States Massachusetts RTK - Substance List
- Hydrogen sulfide (CAS 7783-06-4)
- Sulfur (CAS 7704-34-9)

United States New Jersey Worker and Community Right-to-Know Act
- Hydrogen sulfide (CAS 7783-06-4)
- Sulfur (CAS 7704-34-9)

United States Pennsylvania Worker and Community Right-to-Know Law
- Hydrogen sulfide (CAS 7783-06-4)
- Sulfur (CAS 7704-34-9)

United States Rhode Island RTK
- Hydrogen sulfide (CAS 7783-06-4)

United States California Proposition 65
Not Listed.

International Inventories

<table>
<thead>
<tr>
<th>Country(s) or region</th>
<th>Inventory name</th>
<th>On inventory (yes/no)*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia</td>
<td>Australian Inventory of Chemical Substances (AICS)</td>
<td>Yes</td>
</tr>
<tr>
<td>Canada</td>
<td>Domestic Substances List (DSL)</td>
<td>Yes</td>
</tr>
<tr>
<td>Canada</td>
<td>Non-Domestic Substances List (NDSSL)</td>
<td>No</td>
</tr>
<tr>
<td>China</td>
<td>Inventory of Existing Chemical Substances in China (IECSC)</td>
<td>Yes</td>
</tr>
<tr>
<td>Europe</td>
<td>European Inventory of Existing Commercial Chemical Substances (EINECS)</td>
<td>Yes</td>
</tr>
<tr>
<td>Europe</td>
<td>European List of Notified Chemical Substances (ELINCS)</td>
<td>No</td>
</tr>
<tr>
<td>Japan</td>
<td>Inventory of Existing and New Chemical Substances (ENCS)</td>
<td>Yes</td>
</tr>
<tr>
<td>Korea</td>
<td>Existing Chemicals List (ECL)</td>
<td>Yes</td>
</tr>
<tr>
<td>New Zealand</td>
<td>New Zealand Inventory</td>
<td>Yes</td>
</tr>
<tr>
<td>Philippines</td>
<td>Philippine Inventory of Chemicals and Chemical Substances (PICCS)</td>
<td>Yes</td>
</tr>
</tbody>
</table>
Country(s) or region | Inventory name | On inventory (yes/no)*
--- | --- | ---
United States & Puerto Rico | Toxic Substances Control Act (TSCA) Inventory | Yes

*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 # | 05

NFPA ratings

Disclaimer
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