

# SAFETY DATA SHEET

Sulfur



## Section 1. Identification

**Product name** : Sulfur  
**Product code** : Not available.  
**Synonyms** : Molten Sulfur, Liquefied Sulfur, Brimstone, Elemental Sulfur

### Relevant identified uses of the substance or mixture and uses advised against

**Product use** : Industrial  
**Area of application** : Industrial applications.

**Manufacturer** : HollyFrontier Refining & Marketing LLC  
2828 North Harwood  
Suite 1300  
Dallas, Texas 75201  
USA  
Customer Service: (888) 286-8836

**Emergency telephone number** : CHEMTREC® (800) 424-9300  
CCN 201319

## Section 2. Hazards identification

**OSHA/HCS status** : This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

**Classification of the substance or mixture** : H228 FLAMMABLE SOLIDS - Category 2  
H315 SKIN IRRITATION - Category 2  
H319 EYE IRRITATION - Category 2A  
H335 SPECIFIC TARGET ORGAN TOXICITY (SINGLE EXPOSURE) (Respiratory tract irritation) - Category 3

### GHS label elements

**Hazard pictograms** :



**Signal word** : Warning

**Hazard statements** : H228 - Flammable solid.  
H319 - Causes serious eye irritation.  
H315 - Causes skin irritation.  
H335 - May cause respiratory irritation.

### Precautionary statements

**Prevention** : Wear protective gloves: > 8 hours (breakthrough time): Recommended: Wear heat resistant gloves when used at elevated temperatures.. Wear eye or face protection. Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. Use only outdoors or in a well-ventilated area. Avoid breathing dust. Wash hands thoroughly after handling.

**Response** : IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER or physician if you feel unwell. IF ON SKIN: Wash with plenty of soap and water. Take off contaminated clothing and wash it before reuse. If skin irritation occurs: Get medical attention. 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 attention.

**Storage** : Not applicable.

**Disposal** : Dispose of contents and container in accordance with all local, regional, national and international regulations.

**Supplemental label elements** : Heated material can cause thermal burns.

**Hazards not otherwise classified** : May contain or release hydrogen sulfide gas.

## Section 3. Composition/information on ingredients

**Substance/mixture** : Substance

### CAS number/other identifiers

**CAS number** : Not available.

Ingredient name	Other names	%	CAS number
sulfur	-	>99	7704-34-9
sulfur dioxide	-	0 - 0.001	7446-09-5
hydrogen sulfide	-	<0.0001	7783-06-4

Any concentration shown as a range is to protect confidentiality or is due to batch variation.

**There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this section.**

Occupational exposure limits, if available, are listed in Section 8.

## Section 4. First aid measures

### Description of necessary first aid measures

- Eye contact** : Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Get medical attention. Continue to rinse for at least 15 minutes.
- Inhalation** : Remove victim to fresh air and keep at rest in a position comfortable for breathing. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Get medical attention. If necessary, call a poison center or physician. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.
- Skin contact** : Flush contaminated skin with plenty of water. Remove contaminated clothing and shoes. Continue to rinse for at least 15 minutes. Get medical attention. Wash clothing before reuse. Clean shoes thoroughly before reuse.
- Ingestion** : Do not induce vomiting unless directed to do so by medical personnel. If vomiting occurs, the head should be kept low so that vomit does not enter the lungs. Wash out mouth with water. Remove victim to fresh air and keep at rest in a position comfortable for breathing. Get medical attention if adverse health effects persist or are severe. Never give anything by mouth to an unconscious person. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.

### Most important symptoms/effects, acute and delayed

#### Potential acute health effects

- Eye contact** : Causes serious eye irritation.
- Inhalation** : May cause respiratory irritation.
- Skin contact** : Causes skin irritation.
- Ingestion** : No known significant effects or critical hazards.

#### Over-exposure signs/symptoms

- Eye contact** : pain or irritation; watering; redness
- Inhalation** : respiratory tract irritation; coughing
- Skin contact** : irritation; redness
- Ingestion** : No specific data.

### Indication of immediate medical attention and special treatment needed, if necessary

- Notes to physician** : Treat symptomatically. Contact poison treatment specialist immediately if large quantities have been ingested or inhaled.

- Specific treatments** : No specific treatment.
- Protection of medical responders** : No action shall be taken involving any personal risk or without suitable training. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation.

See toxicological information (Section 11)

## Section 5. Fire-fighting measures

### Extinguishing media

- Suitable extinguishing media** : Use dry chemical, CO<sub>2</sub>, water spray (fog) or foam.
- Unsuitable extinguishing media** : Do not use water jet.

**Specific hazards arising from the chemical** : Flammable solid. May release hydrogen sulfide a poisonous gas that can accumulate in confined spaces.

**Hazardous thermal decomposition products** : Decomposition products may include the following materials:  
sulfur oxides

**Special protective actions for fire-fighters** : Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training. Move containers from fire area if this can be done without risk. Use water spray to keep fire-exposed containers cool.

**Special protective equipment for fire-fighters** : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

## Section 6. Accidental release measures

### Personal precautions, protective equipment and emergency procedures

- For non-emergency personnel** : No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilled material. Shut off all ignition sources. No flares, smoking or flames in hazard area. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment. May release hydrogen sulfide a poisonous gas that can accumulate in confined spaces.
- For emergency responders** : If specialized clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in "For non-emergency personnel".

**Environmental precautions** : Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).

### Methods and materials for containment and cleaning up

- Small spill** : Move containers from spill area. Use spark-proof tools and explosion-proof equipment. Avoid dust generation. Using a vacuum with HEPA filter will reduce dust dispersal. Place spilled material in a designated, labeled waste container. Dispose of via a licensed waste disposal contractor.
- Large spill** : Move containers from spill area. Use spark-proof tools and explosion-proof equipment. Approach release from upwind. Prevent entry into sewers, waterways, basements or confined areas. Avoid dust generation. Do not dry sweep. Vacuum dust with equipment fitted with a HEPA filter and place in a closed, labeled waste container. Dispose of via a licensed waste disposal contractor. Note: see Section 1 for emergency contact information and Section 13 for waste disposal.

## Section 7. Handling and storage

### Precautions for safe handling

**Protective measures** : Put on appropriate personal protective equipment (see Section 8). Do not ingest. Avoid contact with eyes, skin and clothing. Use only with adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Do not enter storage areas and confined spaces unless adequately ventilated. Keep in the original container or an approved alternative made from a compatible material, kept tightly closed when not in use. Store and use away from heat, sparks, open flame or any other ignition source. Use only non-sparking tools. Empty containers retain product residue and can be hazardous. Do not reuse container. May release hydrogen sulfide a poisonous gas that can accumulate in confined spaces.

**Advice on general occupational hygiene** : Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. See also Section 8 for additional information on hygiene measures.

**Conditions for safe storage, including any incompatibilities** : Store in accordance with local regulations. Store in a segregated and approved area. Store in original container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10) and food and drink. Eliminate all ignition sources. Separate from oxidizing materials. Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabeled containers. Use appropriate containment to avoid environmental contamination.

## Section 8. Exposure controls/personal protection

### Control parameters

#### Occupational exposure limits

Ingredient name	Exposure limits
sulfur sulfur dioxide	None. <b>ACGIH TLV (United States, 3/2017).</b> STEL: 0.25 ppm 15 minutes. <b>NIOSH REL (United States, 10/2016).</b> TWA: 2 ppm 10 hours. TWA: 5 mg/m <sup>3</sup> 10 hours. STEL: 5 ppm 15 minutes. STEL: 13 mg/m <sup>3</sup> 15 minutes. <b>OSHA PEL (United States, 6/2016).</b> TWA: 5 ppm 8 hours. TWA: 13 mg/m <sup>3</sup> 8 hours.
hydrogen sulfide	<b>ACGIH TLV (United States, 3/2017).</b> TWA: 1 ppm 8 hours. STEL: 5 ppm 15 minutes. <b>OSHA PEL Z2 (United States, 2/2013).</b> CEIL: 20 ppm AMP: 50 ppm 10 minutes. <b>NIOSH REL (United States, 10/2016).</b> CEIL: 10 ppm 10 minutes. CEIL: 15 mg/m <sup>3</sup> 10 minutes.

**Appropriate engineering controls** : Use only with adequate ventilation. If user operations generate dust, fumes, gas, vapor or mist, use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits. The engineering controls also need to keep gas, vapor or dust concentrations below any lower explosive limits. Use explosion-proof ventilation equipment. May release hydrogen sulfide a poisonous gas that can accumulate in confined spaces.

**Environmental exposure controls** : Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

### Individual protection measures

- Hygiene measures** : Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.
- Eye/face protection** : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists, gases or dusts. If contact is possible, the following protection should be worn, unless the assessment indicates a higher degree of protection: chemical splash goggles.
- Skin protection**
- Hand protection** : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary. Considering the parameters specified by the glove manufacturer, check during use that the gloves are still retaining their protective properties. It should be noted that the time to breakthrough for any glove material may be different for different glove manufacturers. In the case of mixtures, consisting of several substances, the protection time of the gloves cannot be accurately estimated. Recommended: Wear heat resistant gloves when used at elevated temperatures.
- Body protection** : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product. When there is a risk of ignition from static electricity, wear anti-static protective clothing. For the greatest protection from static discharges, clothing should include anti-static overalls, boots and gloves.
- Other skin protection** : Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.
- Respiratory protection** : Based on the hazard and potential for exposure, select a respirator that meets the appropriate standard or certification. Respirators must be used according to a respiratory protection program to ensure proper fitting, training, and other important aspects of use.

## Section 9. Physical and chemical properties

### Appearance

- Physical state** : Solid. :< 119°C (246°F)  
Liquid.: > 119°C ( 246°F)
- Color** : Yellow.
- Odor** : Sulfurous. Rotten eggs.
- Odor threshold** : Not available.
- pH** : Not available.
- Melting point** : 119°C (246°F)
- Boiling point** : 444°C (832°F)
- Flash point** : 207°C (405°F)
- Evaporation rate** : Not available.
- Flammability (solid, gas)** : Not available.
- Lower and upper explosive (flammable) limits** : Lower: 35 g/m<sup>3</sup> (as dust)  
Upper: 1400 g/m<sup>3</sup> (as dust)
- Vapor pressure** : 0.13 kPa (1 mm Hg) [185°C (365°F)]
- Vapor density** : >1 [Air = 1]
- Specific gravity** : 1.8
- Density** : Not available.
- Solubility** : Insoluble in the following materials: cold water and hot water.
- Partition coefficient: n-octanol/water** : Not available.
- Auto-ignition temperature** : Not available.
- Decomposition temperature** : Not available.
- Viscosity** : Not available.
- Flow time (ISO 2431)** : Not available.
- Molecular weight** : 32.06 g/mole

**Physical/chemical properties comments** : Bulk density:15 lbs/gal

## Section 10. Stability and reactivity

**Reactivity** : No specific test data related to reactivity available for this product or its ingredients.

**Chemical stability** : The product is stable.

**Possibility of hazardous reactions** : Under normal conditions of storage and use, hazardous reactions will not occur.  
Under normal conditions of storage and use, hazardous polymerization will not occur.

**Conditions to avoid** : Avoid all possible sources of ignition (spark or flame).

**Incompatible materials** : Reactive or incompatible with the following materials: oxidizing materials, reducing materials and metal oxide

**Hazardous decomposition products** : Under normal conditions of storage and use, hazardous decomposition products should not be produced.

## Section 11. Toxicological information

### Information on toxicological effects

#### Acute toxicity

Product/ingredient name	Result	Species	Dose	Exposure
sulfur	LD50 Dermal	Rat	>2000 mg/kg	-
	LD50 Oral	Rat	>2000 mg/kg	-
sulfur dioxide	LC50 Inhalation Gas.	Rat	2420 ppm	1 hours
	LC50 Inhalation Gas.	Rat	1260 ppm	4 hours
hydrogen sulfide	LC50 Inhalation Gas.	Rat	444 ppm	4 hours

#### Irritation/Corrosion

Not available.

#### Carcinogenicity

Product/ingredient name	OSHA	IARC	NTP
sulfur dioxide	-	3	-

#### Specific target organ toxicity (single exposure)

Name	Category	Route of exposure	Target organs
sulfur	Category 3	Not applicable.	Respiratory tract irritation
hydrogen sulfide	Category 3	Not applicable.	Respiratory tract irritation and Narcotic effects

#### Specific target organ toxicity (repeated exposure)

Name	Category	Route of exposure	Target organs
hydrogen sulfide	Category 2	Inhalation	lungs

#### Aspiration hazard

Not available.

**Information on the likely routes of exposure** : Routes of entry anticipated: Oral, Dermal, Inhalation.

#### Delayed and immediate effects and also chronic effects from short and long term exposure



**Short term exposure**

**Potential immediate effects** : Not available.

**Potential delayed effects** : Not available.

**Long term exposure**

**Potential immediate effects** : Not available.

**Potential delayed effects** : Not available.

**Potential chronic health effects**

**General** : No known significant effects or critical hazards.

**Carcinogenicity** : No known significant effects or critical hazards.

**Mutagenicity** : No known significant effects or critical hazards.

**Teratogenicity** : No known significant effects or critical hazards.

**Developmental effects** : No known significant effects or critical hazards.

**Fertility effects** : No known significant effects or critical hazards.

**Numerical measures of toxicity****Acute toxicity estimates**

Not available.

**Section 12. Ecological information****Toxicity**

Product/ingredient name	Result	Species	Exposure
sulfur hydrogen sulfide	Acute LC50 100 ppm Fresh water	Fish - Oncorhynchus mykiss	96 hours
	Acute EC50 62 µg/l Fresh water	Crustaceans - Gammarus pseudolimnaeus	2 days
	Acute LC50 2 µg/l Fresh water	Fish - Coregonus clupeaformis - Yolk-sac fry	96 hours

**Persistence and degradability**

Not available.

**Bioaccumulative potential**

Not available.

**Mobility in soil**




**Soil/water partition coefficient (K<sub>oc</sub>)** : Not available.

**Other adverse effects** : No known significant effects or critical hazards.

**Section 13. Disposal considerations**

**Disposal methods** : The generation of waste should be avoided or minimized wherever possible. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of all authorities with jurisdiction. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible. This material and its container must be disposed of in a safe way. Care should be taken when handling emptied containers that have not been cleaned or rinsed out. Empty containers or liners may retain some product residues. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.

## Section 14. Transport information

	DOT Classification	IMDG	IATA
UN number	NA2448	UN2448	UN2448
UN proper shipping name	Sulfur, molten	SULPHUR, MOLTEN	Sulphur, molten
Transport hazard class(es)	9 	4.1 	4.1 
Packing group	III	III	III
Environmental hazards	No.	No.	No.

### Additional information

<b>DOT Classification</b>	: <b>Limited quantity</b> No. <b>Packaging instruction</b> Exceptions: None. Non-bulk: 213. Bulk: 247. <b>Quantity limitation</b> Passenger aircraft/rail: Forbidden. Cargo aircraft: Forbidden. <b>Special provisions</b> 30, B13, IB3, R1, T1, TP3
<b>IMDG</b>	: <b>Emergency schedules</b> F-A, S-H
<b>IATA</b>	: <b>Quantity limitation</b> Passenger and Cargo Aircraft: Forbidden. Packaging instructions: Forbidden. Cargo Aircraft Only: Forbidden. Packaging instructions: Forbidden. Limited Quantities - Passenger Aircraft: Forbidden. Packaging instructions: Forbidden.

**Special precautions for user** : **Transport within user's premises:** always transport in closed containers that are upright and secure. Ensure that persons transporting the product know what to do in the event of an accident or spillage.

## Section 15. Regulatory information

**U.S. Federal regulations** : **United States inventory (TSCA 8b):** All components are listed or exempted.  
**Clean Water Act (CWA) 311:** hydrogen sulfide

**Clean Air Act Section 112** : Listed

**(b) Hazardous Air Pollutants (HAPs)**

**SARA 302/304**

### Composition/information on ingredients

Name	%	EHS	SARA 302 TPQ		SARA 304 RQ	
			(lbs)	(gallons)	(lbs)	(gallons)
sulfur dioxide	0 - 0.001	Yes.	500	-	500	-
hydrogen sulfide	<0.0001	Yes.	500	-	100	-

**SARA 304 RQ** : 100000000 lbs / 45400000 kg

**SARA 311/312**

**Classification** : FLAMMABLE SOLIDS - Category 2  
SKIN IRRITATION - Category 2  
EYE IRRITATION - Category 2A  
SPECIFIC TARGET ORGAN TOXICITY (SINGLE EXPOSURE) (Respiratory tract irritation) - Category 3

### Composition/information on ingredients



Name	%	Classification
sulfur	>99	FLAMMABLE SOLIDS - Category 2 SKIN IRRITATION - Category 2 EYE IRRITATION - Category 2A SPECIFIC TARGET ORGAN TOXICITY (SINGLE EXPOSURE) (Respiratory tract irritation) - Category 3
sulfur dioxide	0 - 0.001	GASES UNDER PRESSURE - Compressed gas ACUTE TOXICITY (inhalation) - Category 3 SKIN CORROSION - Category 1B SERIOUS EYE DAMAGE - Category 1 GERM CELL MUTAGENICITY - Category 2
hydrogen sulfide	<0.0001	FLAMMABLE GASES - Category 1 GASES UNDER PRESSURE - Compressed gas ACUTE TOXICITY (inhalation) - Category 2 EYE IRRITATION - Category 2A SPECIFIC TARGET ORGAN TOXICITY (SINGLE EXPOSURE) (Respiratory tract irritation) - Category 3 SPECIFIC TARGET ORGAN TOXICITY (SINGLE EXPOSURE) (Narcotic effects) - Category 3 SPECIFIC TARGET ORGAN TOXICITY (REPEATED EXPOSURE) - Category 2 SPECIFIC TARGET ORGAN TOXICITY (REPEATED EXPOSURE) (lungs) (inhalation) - Category 2

**SARA 313**

Not applicable.

**State regulations**

- Massachusetts** : The following components are listed: SULFUR
- New York** : None of the components are listed.
- New Jersey** : The following components are listed: SULFUR
- Pennsylvania** : The following components are listed: SULFUR
- California Prop. 65**

**⚠ WARNING:** This product can expose you to Sulfur Dioxide, which is known to the State of California to cause birth defects or other reproductive harm. For more information go to [www.P65Warnings.ca.gov](http://www.P65Warnings.ca.gov).

Ingredient name	No significant risk level	Maximum acceptable dosage level
Sulfur Dioxide	-	Yes.

**International regulations**

**Chemical Weapon Convention List Schedules I, II & III Chemicals**

Not listed.

**Montreal Protocol (Annexes A, B, C, E)**

Not listed.

**Stockholm Convention on Persistent Organic Pollutants**

Not listed.

**Rotterdam Convention on Prior Informed Consent (PIC)**

Not listed.

**UNECE Aarhus Protocol on POPs and Heavy Metals**

Not listed.

**Section 16. Other information**

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



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Copyright ©2001, National Fire Protection Association, Quincy, MA 02269. This warning system is intended to be interpreted and applied only by properly trained individuals to identify fire, health and reactivity hazards of chemicals. The user is referred to certain limited number of chemicals with recommended classifications in NFPA 49 and NFPA 325, which would be used as a guideline only. Whether the chemicals are classified by NFPA or not, anyone using the 704 systems to classify chemicals does so at their own risk.

#### Procedure used to derive the classification

Classification	Justification
Flam. Sol. 2, H228 Skin Irrit. 2, H315 Eye Irrit. 2A, H319 STOT SE 3, H335	Expert judgment Calculation method Calculation method Calculation method

**Date of issue/Date of revision** : 04/03/2018

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**Version** : 3

**Key to abbreviations** :

- ATE = Acute Toxicity Estimate
- BCF = Bioconcentration Factor
- GHS = Globally Harmonized System of Classification and Labelling of Chemicals
- IATA = International Air Transport Association
- IMDG = International Maritime Dangerous Goods
- LogPow = logarithm of the octanol/water partition coefficient
- UN = United Nations

▣ Indicates information that has changed from previously issued version.

#### Notice to reader

To the best of our knowledge, the information contained herein is accurate. However, neither the above-named manufacturer, nor any of its subsidiaries, assumes any liability whatsoever for the accuracy or completeness of the information contained herein.

Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.