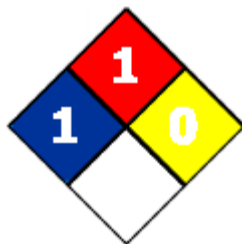


SAFETY DATA SHEET



Revision Date 24-Jul-2018

SDS Number 888100004468

Revision Number 2.02

1. IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND OF THE COMPANY

Product Name Sulfur, Molten

Synonyms Liquefied Sulfur, Sulphur, Process Stream, S-266, CBg, AA7, Molten Liquid Sulfur, Sulfur Bonded, APPC845

Recommended Use Refining byproduct
Uses advised against All others

Manufacturer
Tesoro Refining & Marketing Co.
19100 Ridgewood Parkway
San Antonio, TX 78259

Emergency Telephone Chemtrec: 1-800-424-9300
Tesoro Call Center: 1-877-783-7676

E-mail address ProductStewardship@TSOCORP.com

2. HAZARDS IDENTIFICATION

Classification

This chemical is considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200)

Skin Corrosion/Irritation Category	Category 2
Chronic Aquatic Toxicity	Category 3

Label elements

Warning

Causes skin irritation
Harmful to aquatic life with long lasting effects



Appearance Liquid

Physical State @20°C Liquid

Odor Pungent rotten-egg like

Precautionary Statements - Prevention

Wash face, hands and any exposed skin thoroughly after handling
Wear protective gloves

IF ON SKIN: Wash with plenty of water and soap
If skin irritation occurs: Get medical advice/attention
Take off contaminated clothing and wash it before reuse

Hazards not otherwise classified (HNOC)

Contact with product at elevated temperatures can result in thermal burns
May release hydrogen sulfide gas

Other Information

May be harmful if swallowed. May be harmful in contact with skin. Harmful to aquatic life.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Chemical Name	CAS-No	Percent
Sulfur	7704-34-9	0-100
Hydrogen Sulfide	7783-06-4	0<1

4. FIRST AID MEASURES

Description of first aid measures

General advice	Show this safety data sheet to the doctor in attendance.
Inhalation	Remove to fresh air. Artificial respiration and/or oxygen may be necessary. Get medical attention immediately if symptoms occur.
Eye contact	Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Keep eye wide open while rinsing. Remove contact lenses, if present and easy to do. Continue rinsing. Get medical attention if irritation develops and persists.
Skin contact	Wash off immediately with soap and plenty of water for at least 15 minutes. After contact with molten product, cool skin area rapidly with cold water. Do not try to removed solidified material from the skin. Removal of solidified molten material from skin requires medical assistance. Get immediate medical advice/attention.
Ingestion	Clean mouth with water and drink afterwards plenty of water. Never give anything by mouth to an unconscious person. Do NOT induce vomiting. Call a physician.
Self-protection of the first aider	Avoid contact with skin, eyes or clothing. Wear personal protective clothing (see section 8).

Most important symptoms and effects, both acute and delayed

Indication of any immediate medical attention and special treatment needed

Note to physicians	Treat symptomatically.
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5. FIRE-FIGHTING MEASURES

Suitable Extinguishing Media	Dry chemical, CO2, sand, earth, water spray or regular foam.
Small Fire	Use dry sand, dry chemical or alcohol-resistant foam to extinguish.
Large Fire	Use dry sand, dry chemical or alcohol-resistant foam to extinguish.

Unsuitable extinguishing media	Do not use straight streams. Do not scatter spilled material with high pressure water streams. Do not spray water directly into containers due to danger of boil over.			
Specific hazards arising from the chemical	Toxic fumes of sulfur dioxide will result from combustion.			
Hazardous combustion products	Oxides of sulfur.			
Explosion data				
Sensitivity to Mechanical Impact	None.			
Sensitivity to Static Discharge	No.			
Special protective equipment for fire-fighters	Firefighters should wear self-contained breathing apparatus and full firefighting turnout gear. For massive fire, use unmanned hose holders or monitor nozzles; if this is impossible withdraw from area and let fire burn.			
Further information	ALWAYS stay away from tanks engulfed in fire. Fight fire from maximum distance or use unmanned hose holders or monitor nozzles. Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank. Do not direct water at source of leak or safety devices; icing may occur. Cool containers with flooding quantities of water until well after fire is out. Do not allow run-off from fire-fighting to enter drains or water courses.			
NFPA	Health hazards 1	Flammability 1	Stability 0	Physical and chemical properties -

6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures

Personal precautions	Avoid contact with skin, eyes or clothing. Ensure adequate ventilation. Use personal protective equipment as required.
Other Information	Refer to protective measures listed in Sections 7 and 8.

Environmental precautions

Environmental precautions	Prevent further leakage or spillage if safe to do so. Prevent entry into waterways, sewers, basements or confined areas.
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Methods and material for containment and cleaning up

Methods for containment	Dike far ahead of spill; use dry sand to contain the flow of material.
Methods for cleaning up	Pick up and transfer to properly labeled containers.
Prevention of secondary hazards	Clean contaminated objects and areas thoroughly observing environmental regulations.

7. HANDLING AND STORAGE

Precautions for safe handling

Advice on safe handling	Handle in accordance with good industrial hygiene and safety practice. Avoid contact with skin, eyes or clothing. Do not eat, drink or smoke when using this product. Use grounding and bonding connection when transferring this material to prevent static discharge, fire or explosion. Avoid generation of dust. Fine dust dispersed in air, in sufficient concentrations, and in the presence of an ignition source is a potential dust explosion hazard. Toxic concentrations of hydrogen sulfide may accumulate in tanks and bulk transport compartments.
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Conditions for safe storage, including any incompatibilities

Storage Conditions

Keep containers tightly closed in a dry, cool and well-ventilated place. Store in accordance with local regulations.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Chemical Name	ACGIH TLV	OSHA PEL
Hydrogen Sulfide 7783-06-4	STEL: 5 ppm TWA: 1 ppm	(vacated) TWA: 10 ppm (vacated) TWA: 14 mg/m ³ (vacated) STEL: 15 ppm (vacated) STEL: 21 mg/m ³ Ceiling: 20 ppm

NOTE: Limits shown for guidance only. For additional information, OSHA's 1989 air contaminants standard exposure limits provided even though the limits were vacated in 1992. State, local or other agencies or advisory groups may have established more stringent limits. Follow applicable regulations.

Appropriate engineering controls

Engineering controls Showers
 Eyewash stations
 Ventilation systems.

Individual protection measures, such as personal protective equipment

Eye/face protection Use goggles or face-shield where there is a possibility of splashing.

Hand Protection Wear suitable gloves. Impervious gloves.

Skin and body protection Wear suitable protective clothing. Long sleeved clothing.

Respiratory protection When workers are facing concentrations above the exposure limit they must use appropriate certified respirators. Use a NIOSH approved respirator when there is a potential for airborne concentrations to exceed occupational exposure limits. Refer to OSHA 29 CFR 1910.134, ANSI Z88.2, NIOSH Respirator Decision Logic, and the respirator manufacturer for additional guidance on respiratory protection selection. A Self-Contained Breathing Apparatus (SCBA) should be used for fire fighting. Use a NIOSH approved positive-pressure supplied air respirator if there is a potential for uncontrolled release, exposure levels are unknown, in oxygen deficient (less than 19.5% oxygen), or any other circumstance where an air-purifying respirator may not provide adequate protection.

General hygiene considerations Wear suitable gloves and eye/face protection. Do not eat, drink or smoke when using this product.

9. PHYSICAL AND CHEMICAL PROPERTIES

Information on basic physical and chemical properties

Physical State @20°C Liquid
Appearance Liquid
Odor Pungent rotten-egg like
Color Yellow
Odor threshold Reported as low as ppb or less

<u>Property</u>	<u>Values</u>	<u>Remarks • Method</u>
pH	Not applicable	
Melting point / freezing point	107 °C / 225 °F	
Boiling range	445 °C	
Flash point	167 °C / 333 °F	
Evaporation rate	No data available	
Flammability (solid, gas)	Solid	
Flammability Limit in Air %		

Upper flammability limit:	1400 g/m ³ for airborne dust
Lower flammability limit:	15 g/m ³ for airborne dust
Vapor pressure	1.3
Vapor density	No data available
Relative density	2.1
Water solubility	Insoluble
Solubility in other solvents	No data available
Partition coefficient	No data available
Autoignition temperature	235 °C / 455 °F
Decomposition temperature	No data available
Kinematic viscosity	No data available
Dynamic viscosity	No data available
Explosive properties	No data available
Oxidizing properties	No data available
Minimum Ignition Energy (mJ)	< 1mJ
K_{st} (bar.m/s)	151 bar-m/s for dust from solid sulfur
Softening point	No data available
VOC Content (%)	No data available
Density	No data available
Bulk density	Not applicable
Conductivity	No data available

10. STABILITY AND REACTIVITY

Reactivity	This product is non-reactive under normal conditions.
Chemical stability	Stable under recommended storage conditions.
Possibility of hazardous reactions	None under normal processing.
Conditions to avoid	Heat, flames and sparks.
Incompatible materials	Strong acids. Strong bases. Strong oxidizing agents.
Hazardous decomposition products	SULFUR DIOXIDE.

11. TOXICOLOGICAL INFORMATION

Information on likely routes of exposure

Inhalation	Specific test data for the substance or mixture is not available. May cause irritation of respiratory tract.
Eye contact	Specific test data for the substance or mixture is not available. Irritating to eyes. (based on components).
Skin contact	Specific test data for the substance or mixture is not available. Causes skin irritation. (based on components).
Ingestion	Specific test data for the substance or mixture is not available. Ingestion may cause gastrointestinal irritation, nausea, vomiting and diarrhea.

Information on toxicological effects

Symptoms	Redness. May cause redness and tearing of the eyes.
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Numerical measures of toxicity

Acute toxicity

The following values are calculated based on chapter 3.1 of the GHS document .

ATEmix (oral)	3,003.00 mg/kg
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ATEmix (dermal) 2,002.00 mg/kg
 ATEmix (inhalation-gas) 35,512.76 mg/l
 ATEmix (inhalation-dust/mist) 5.01 mg/l

Chemical Name	Oral LD50	LD50/dermal/rat - NO UNITS (Wizards mg/kg)	Inhalation LC50
Sulfur 7704-34-9	> 3000 mg/kg (Rat)	> 2000 mg/kg (Rabbit)	> 9.23 mg/L (Rat) 4 h
Hydrogen Sulfide 7783-06-4	-	-	= 700 mg/m ³ (Rat) 4 h

Delayed and immediate effects as well as chronic effects from short and long-term exposure

**Chemical Name
Hydrogen Sulfide**

Hydrogen Sulfide may be fatal if inhaled. The nervous system and respiratory tract are the main targets of hydrogen sulfide toxicity. Short term (acute) overexposure may cause irritation to the eyes, nose or throat. At high enough levels, effects on the nervous system include headaches, poor concentration, poor memory, unconsciousness, and death. Hydrogen sulfide has a strong odor that is characteristic of rotten eggs; however, the odor is not a reliable warning property as olfactory fatigue occurs at high levels. Respiratory distress or arrest can occur at high concentrations. Direct contact of the liquid with skin can cause frostbite; contact with the eyes can cause redness or severe burns. Cardiovascular effects have also been observed. NIOSH has determined that 100 ppm is immediately dangerous to life and health.

Health hazard and classification information

Skin Corrosion/Irritation Category Classification based on data available for ingredients. Irritating to skin.

Serious eye damage/eye irritation No information available.
 No information available.

Germ cell mutagenicity No information available.

Carcinogenicity No information available.

Reproductive toxicity No information available.

Target Organ Systemic Toxicant - Single Exposure No information available.

Target Organ Systemic Toxicant - Repeated Exposure No information available.

Target organ effects Respiratory system, Eyes, Central nervous system.

Aspiration hazard No information available.

12. ECOLOGICAL INFORMATION

Additional Ecological Information Release of this product should be prevented from contaminating soil and water and from entering drainage and sewer systems. U.S.A. regulations require reporting spills of this material that could reach any surface waters. The toll free number to the U.S. Coast Guard National Response Center is (800) 424-8802

Ecotoxicity Harmful to aquatic life with long lasting effects.

Chemical Name	Algae/aquatic plants	Fish	Toxicity to microorganisms	Crustacea
Sulfur	-	14: 96 h Lepomis	-	-

7704-34-9		macrochirus mg/L LC50 static 866: 96 h Brachydanio rerio mg/L LC50 static 180: 96 h Oncorhynchus mykiss mg/L LC50 static		
Hydrogen Sulfide 7783-06-4	-	0.016: 96 h Pimephales promelas mg/L LC50 flow-through 0.0448: 96 h Lepomis macrochirus mg/L LC50 flow-through	-	0.022: 96 h Gammarus pseudolimnaeus mg/L LC50

Persistence and degradability No information available.

Bioaccumulation There is no data for this product.

Component Information

Chemical Name	Partition coefficient
Hydrogen Sulfide 7783-06-4	0.45

Other adverse effects No information available.

13. DISPOSAL CONSIDERATIONS

Waste treatment methods

Waste from residues/unused products Dispose of in accordance with local regulations. Dispose of waste in accordance with environmental legislation.

Contaminated packaging Do not reuse empty containers.

US EPA Waste Number U135

Chemical Name	RCRA	RCRA - Basis for Listing	RCRA - D Series Wastes	RCRA - U Series Wastes
Hydrogen Sulfide 7783-06-4	U135	-	-	U135

14. TRANSPORT INFORMATION

DOT

UN/ID no UN2448
Proper Shipping Name SULFUR, MOLTEN
Hazard Class 4.1
Packing group III
Reportable Quantity (RQ) (Hydrogen sulfide (H2S): RQ (kg)= 45.40)
Special Provisions 30, B13, IB1, R1, T1, TP3
Description UN2448, SULFUR, MOLTEN, 4.1, III
Emergency Response Guide Number 133

TDG

UN/ID no UN2448
Proper Shipping Name MOLTEN SULFUR
Hazard Class 4.1
Packing group III

Description UN2448, MOLTEN SULFUR, 4.1, III

MEX

UN/ID no UN2448
Proper Shipping Name SULPHUR, MOLTEN
Hazard Class 4.1
Packing group III
Description UN2448, SULPHUR, MOLTEN, 4.1, III

IATA

Forbidden BY PASSENGER AIR Not regulated
UN/ID no UN2448
Packing group III
Description Forbidden

IMDG

UN/ID no UN2448
Proper Shipping Name SULPHUR, MOLTEN
Hazard Class 4.1
Packing group III
EmS No. F-A, S-H
Description UN2448, SULPHUR, MOLTEN, 4.1, III

15. REGULATORY INFORMATION

International Inventories

TSCA Listed
DSL/NDSL Listed
ENCS Not Listed
IECSC Listed
KECL Listed
PICCS Listed
AICS Listed

Legend:

TSCA - United States Toxic Substances Control Act Section 8(b) Inventory
DSL/NDSL - Canadian Domestic Substances List/Non-Domestic Substances List
ENCS - Japan Existing and New Chemical Substances
IECSC - China Inventory of Existing Chemical Substances
KECL - Korean Existing and Evaluated Chemical Substances
PICCS - Philippines Inventory of Chemicals and Chemical Substances
AICS - Australian Inventory of Chemical Substances

US Federal Regulations

SARA 313

Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA). This product does not contain any chemicals which are subject to the reporting requirements of the Act and Title 40 of the Code of Federal Regulations, Part 372.

SARA 311/312 Hazard Categories

Acute health hazard Yes
Chronic Health Hazard No
Fire hazard No
Sudden release of pressure hazard No
Reactive Hazard No

CWA (Clean Water Act)

This product contains the following substances which are regulated pollutants pursuant to the Clean Water Act (40 CFR 122.21 and 40 CFR 122.42).

Chemical Name	CWA - Reportable Quantities	CWA - Toxic Pollutants	CWA - Priority Pollutants	CWA - Hazardous Substances
Hydrogen Sulfide	100 lb	-	-	X

7783-06-4				
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CERCLA

The CERCLA definition of hazardous substances contains a "petroleum exclusion" clause which exempts crude oil, fractions of crude oil, and products (both finished and intermediate) from the crude oil refining process and any indigenous components of such from the CERCLA Section 103 reporting requirements. However, other federal reporting requirements, including SARA Section 304, as well as the Clean Water Act may still apply.

US State Regulations

California Proposition 65

This product does not contain any Proposition 65 chemicals.

U.S. State Right-to-Know Regulations

US State Regulations

Chemical Name	New Jersey	Massachusetts	Pennsylvania
Sulfur 7704-34-9	X	X	X
Hydrogen Sulfide 7783-06-4	X	X	X

16. OTHER INFORMATION, INCLUDING DATE OF PREPARATION OF THE LAST REVISION

Revision Date 24-Jul-2018

Revision Note No information available.

Disclaimer

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End of Safety Data Sheet