Safety Data Sheet (SDS)

SECTION 1: IDENTIFICATION

Trade Name & Synonyms	**Molten Sulfur, Liquefied Sulfur, Process Stream Sulfur**
Chemical Name	Sulfur
CAS Number	7704-34-9
Family Name	Element – Sulfur
Chemical Formula	S_8
Recommended Use	Manufacture of sulfuric acid; various agricultural and chemical intermediate uses.
Restrictions on Use	Keep away from heat sources, sparks, or open flames. This material can contain hydrogen sulfide (H_2S), a very toxic and extremely flammable gas.
Manufacturer/Supplier	***Sales and Technical Services*** **International Sulphur, Inc.** P. O. Box 611 Mt. Pleasant, TX 75456 Tel: (903) 577-5500 Fax: (903) 577-5540 isulphur@internationalsulphur.com ***Shipping and Receiving*** **International Sulphur, Inc.** 1386 North Frontage Road Mt. Pleasant, TX 75455 Tel: (903) 577-5500 Fax: (903) 577-5540 GPS Coordinates: 33° 9' 34" N 95° 03' 29" W
Emergency Assistance	CHEMTREC Tel: (800) 424-9300 within the USA Tel: 001-703-527-3887 outside the USA

SECTION 2: HAZARDS IDENTIFICATION

GHS Classifications

Skin irritant, Category 2
Eye irritant, Category 2
Flammability, Category 2
Aspiration toxicity, Category 3

KEY
4 = Severe
3 = Serious
2 = Moderate
1 = Slight
0 = Minimal

GHS Label Elements

WARNING

Irritant (Eye and Skin) | Flammable Solid | Aspiration Toxicity

SECTION 2: HAZARDS IDENTIFICATION (CONT)

Hazard Statement	H228: Flammable solid. H290: May be corrosive to metals. H303: May be harmful if swallowed. H316: May cause mild skin irritation. H320: May cause eye irritation. H335: May cause respiratory irritation.
Prevention Statement	P210: Keep away from heat/sparks/open flames/hot surfaces. No smoking. P220: Keep away from oxidizing agents. P424: Use non-sparking tools when available. P243: Take precautionary measures against static discharge. P261: Avoid breathing dust/fume/gas/mist/vapors/spray. P264: Wash hands thoroughly after handling and before eating. P284: In case of inadequate ventilation, wear respiratory protection.
Response Statement	P362: Take off contaminated clothing. P363: Wash contaminated clothing before reuse. P370+P378: In case of a fire, use water fog, spray, or regular foam to extinguish. Do not use a direct water stream. P381: Eliminate all ignition sources.
Storage Statement	P402: Store in a dry place. P403: Store in a well-ventilated place. P404: Store in a closed container.

SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

Chemical Characterization

Mixture

Product	Percentage Contained	CAS Number
Sulfur	>99.9%	7704-34-9
H_2S	0-0.1%	7783-06-4

Hazardous Ingredient None

SECTION 4: FIRST AID MEASURES

Description of First Aid Measures

Skin Heated material can cause thermal burns. Hot material: In case of contact, immediately flush skin with plenty of water for at least 15 minutes. Do not remove solidified material from the skin. Remove contaminated clothing and shoes. Wash contaminated clothing before reuse. Clean shoes thoroughly before reuse. SEEK MEDICAL ATTENTION.

Eye Heated material can cause thermal burns and will cause serious damage to the eyes. Exposure to vapor can cause eye irritation. Hot material: Immediately flush eyes with plenty of water for at least 15 minutes; occasionally lifting the upper and lower eyelids. SEEK MEDICAL ATTENTION.

Inhalation Vapors containing hydrogen sulfide may accumulate during storage or transport. May be harmful or fatal if inhaled. If inhaled, move to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. SEEK MEDICAL ATTENTION.

Ingestion Heated material can cause thermal burns. Ingestion may cause gastrointestinal irritation and diarrhea. Do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. SEEK MEDICAL ATTENTION.

SECTION 4: FIRST AID MEASURES (CONT)

Most Important Symptoms and Effects (Long-Term and Acute)

Refer to *Section 11: Toxicological Information*

Indication of any Immediate Medical Attention or Special Treatment Needed

Individuals with known allergies to sulfide drugs may also have allergic reactions to elemental sulfur.

SECTION 5: FIREFIGHTING MEASURES

Suitable Extinguishing Media In case of fire, use water fog, foam, dry chemicals or carbon dioxide.

Unsuitable Extinguishing Media Do not use water jet.

Exposure Hazards Vapors may form explosive mixtures with air.

Advice for Firefighters Fire-fighters should wear appropriate protective equipment and self-containing breathing apparatus (SCBA) with full face-piece operated in positive pressure mode.

Fire and Explosion Hazards 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.

Combustion Products Combustion products may include the following: Sulfur oxides (SO_2, SO_3, *etc.*) and hydrogen sulfide (H_2S).

SECTION 6: ACCIDENTAL RELEASE MEASURES

Personal Precautions Chemical splash goggles, chemical-resistant protective suits, boots, and chemical-resistant goggles. Self-contained breathing apparatus (SCBA) should be used to avoid inhalation of the product. Suggested protective clothing might not be adequate. Consult a specialist before handling this product. Caution: The protection provided by air purifying respirations is limited. Use a positive pressure air supplied respirator, if there is any potential for an uncontrolled release, if exposure levels are not known, or if concentrations exceed the protection limits of air purifying respirators.

Environmental Precautions

Avoid dispersal of spilled material, 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).

Containment/Cleanup Measures

Large spills Stop leak if without risk. Eliminate all ignition sources. Move containers from spill area and approach release from upwind. Prevent entry into sewers, water courses, basements or confined areas. Wash spillage into an effluent treatment plant or proceed as follows. Contain and collect spillage with noncombustible absorbent material e.g. sand, earth, vermiculite or diatomaceous earth and place in container for disposal according to local regulations (see sec 13) Dispose of via a licensed waste disposal contractor. Contaminated absorbent material may pose the same hazard as the spilled product. (Note: see section 1 for emergency contact information and section 12 for waste disposal).

Small spill Stop leak if without risk and move containers from spill area. Dilute with water and mop up if water soluble or absorb with an inert dry material and place in an appropriate waste disposal container. Dispose of via a licensed waste disposal contractor.

SECTION 7: STORAGE AND HANDLING

Precautions for Safe Handling

Put on appropriate personal protective equipment (see section 8). Workers should wash hands and face before eating, drinking and/or smoking. Do not get in eyes or on skin or clothing. Do not breathe vapor or mist. Do not ingest. Use only with adequate ventilation. Wear appropriate respirator when ventilation is inadequate.

Conditions for Safe Storage, Including any Incompatibilities:

Store in accordance with local regulations. Store away from direct sunlight, in a dry, cool and well-ventilated area, away from incompatible materials (see section 10). Keep containers 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.

Additional information

This material can contain hydrogen sulfide (H_2S), an extremely toxic and flammable gas. Vapors containing H_2S may accumulate during storage or transport and may also be vented during filling of tanks. Hydrogen sulfide has a typical "bad egg" smell, but at high concentrations, the sense of smell is rapidly lost, therefore do not rely on sense of smell for detecting H_2S. Use specially designed measuring instruments for determining its concentration.

Hydrogen sulfide has a characteristic "rotten egg" odor, and at concentrations above 50 ppm or prolonged exposures to low concentrations, may dull the sense of smell that the odor of the gas may not be apparent. NO NOT DEPEND ON THE SENSE OF SMELL TO DETECT H_2S.

SECTION 8: EXPOSURE CONTROLS/ PERSONAL PROTECTION

Personal Protective Equipment

Pictograms

Respiratory

Use only with adequate ventilation. Do not breathe vapor or mist. Air supplied respiratory protection approved by NIOSH should be worn whenever it is required for the worker's face to be within 3 feet of an open hatch. If operating conditions cause high vapor concentrations or the TLV is exceeded, use NIOSH certified, supplied air respirator.

Eyes/Face

Avoid contact with eyes. Goggles, face shield or other full face protection should be worn if there is a risk of direct exposure to aerosols or splashes or when material is handled hot.

Skin/Body

Avoid contact with skin and clothing. When handling hot material, wear heat resistant protective gloves that are able to withstand the temperature of molten product.

Hands

Wear heat-resistant protective gloves that are able to withstand the temperature of molten product. The correct choice of protective gloves depends upon the chemicals being handled, the conditions of work and use, and the condition of the gloves (Even the best chemically resistant glove will break down after repeated chemical exposures). Most gloves provide only a short time of protection before they must be discarded and replaced. Because specific work environments and material handling practices vary, safety procedures should be developed for each intended application. Gloves should therefore be chosen in consultation with the supplier/manufacturer and with a full assessment of the working conditions. Consult your supervisor or SOP for special handling instructions.

SECTION 8: EXPOSURE CONTROLS/ PERSONAL PROTECTION (CONT)

Environmental Exposure Controls	Use only with adequate ventilation. Use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits.
General Industrial Hygiene Considerations	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.

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

Physical State	molten liquid
Appearance	Amber
Formula	S_8 (Rhombic or monoclinic)
Odor	sulfurous, rotten eggs (strong)
Odor Threshold	No data available.
pH	6 – 8 (estimated)
Boiling Point	833° F (445° C)
Melting/Freezing Point	112.8 - 120°C (235 - 248°F)
Flash Point	closed cup: 168 - 207°C (334.4 – 404.6°F)
Evaporation Rate	No data available.
Flammability	vapor is flammable.
Flammable/Explosion Limits	Upper: 44% (v) Lower: 4 % (v)
Vapor Pressure	0.11 mmHg (0.015 kPa)
Vapor Density	8.9 (Air = 1)
Purity	>99.9% Min.
Auto-Ignition Temperature	232 - 260°C (449 - 500°F)
Decomposition Temperature	Does not decompose.
Viscosity	dynamic: 6.5 cP at 151.67°C
Specific Gravity	2.07 @ 70° F
Solubility in Water	Insoluble in water.
Bulk Density	15 lbs. per gallon

SECTION 10: STABILITY AND REACTIVITY

Chemical Stability	Stable.
Conditions to Avoid	Keep from heat sources, sparks, and open flames. Avoid all possible sources of ignition (spark or flame).
Incompatible Materials	Oxidizing agents, halogenated compounds, metals. Molten sulfur may react with hydrocarbons to form disulfide and hydrogen sulfide.
Hazardous Decomposition Products	Oxides of sulfur gases (SO_2, SO_3, *etc*.) and hydrogen sulfide.
Hazardous Polymerization	Under normal conditions of storage and use, hazardous polymerization will not occur.

SECTION 11: TOXICOLOGICAL INFORMATION

Likely Routes of Exposure	Inhalation, ingestion, skin contact, and eye contact.
Signs and Symptoms of Overexposure	Nose or throat irritation, coughing, chest discomfort, asthma, difficulty breathing, skin irritation, nausea, vomiting, stinging eye irritation, and hives.

SECTION 11: TOXICOLOGICAL INFORMATION (CONT)

Occupational Exposure Limits

While specific occupational exposure limits (OEL) for certain components may be shown in this section, other components may be present in any mist, vapor or dust produced; therefore, the specific OEL's may not be applicable to the product as a whole and are provided for guidance only.

Sulfur containing hydrogen sulfide

ACGIH TLV (United States, 1/2007)	NIOSH REL (United States, 12/2001)	OSHA PEL Z2 (United States, 11/2006)
STEL: 21 mg/m^3 15 minute(s)	CEIL: 15 mg/m^3 10 minute(s)	AMP: 50 ppm 10 minute(s)
STEL: 15 ppm 15 minute(s)	CEIL: 10 ppm 10 minute(s)	CEIL: 20 ppm
TWA: 14 mg/m^3 8 hour(s)		
TWA: 10 ppm 8 hour(s)		

Acute Symptoms and Effects

Inhalation Inhalation of low concentrations causes a runny nose with a loss of sense of smell, labored breathing and shortness of breath. Prolonged breathing (greater than 1 hour) of concentrations of H_2S around 50 ppm can produce eye and respiratory tract irritation. Levels of 250 – 600 ppm will result in fluid in the lungs, and concentrations around 1000 ppm will cause unconsciousness and death in a short period of time. Since the sense of smell rapidly becomes insensitive to this toxic, colorless gas, odor cannot be relied upon as an indicator of concentrations of the gas. Always exercise caution when working around closed containers.

Eye Contact Hydrogen sulfide gas may accumulate in storage tanks of bulk transport compartments containing this material. Contact with eyes cause painful conjunctivitis, sensitivity to light, tearing and clouding of vision.

Skin Contact Direct contact with skin causes pain and redness.

Other symptoms Other symptoms of exposure include: profuse salivation, nausea, vomiting, diarrhea, giddiness, headache, dizziness, confusion, rapid breathing, rapid heart rate, sweating, weakness, sudden collapse, unconsciousness and death due to respiratory paralysis. Cardiac neurological effects have also been reported.

Potential chronic health effects

Carcinogenicity No component of this product at levels greater than 0.1% is identified as a carcinogen by ACGIH or the international agency for research on cancer (ARC). No component of this product presents at levels greater than 0.1% is identified as a carcinogen by the U.S. National Toxicology Program (NTP) or the U.S. Occupational Safety and Health Act (OSHA).

SECTION 12: ECOLOGICAL INFORMATION

No testing has been performed by the manufacturer.

Mobility This product is not likely to move rapidly with surface or groundwater flows because of its low water solubility of less than 0.1%.

SECTION 13: DISPOSAL CONSIDERATIONS

Waste Treatment Methods

The generation of waste should be avoided or minimized wherever possible. Empty containers or liners may retain some product residues. This material and its container must be disposed of in a safe way. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. 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. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.

NOTE: The generator of waste has the responsibility of proper waste identification (based on characteristic(s) or listing), transportation and disposal.

SECTION 14: TRANSPORTATION INFORMATION

International transport regulations

Regulatory information	UN Number	Proper Shipping Name	Classes	Packaging Group	Additional information
DOT (Domestic)	NA2448	Sulfur, molten or Sulphur, molten	9	III	No data available
DOT (International)	UN2448	Sulfur, molten or Sulphur, molten	4.1	III	No data available
TDG	UN2448	Sulfur, molten or Sulphur, molten	4.1	III	No data available
IATA/ICAO	UN2448	Sulfur, molten or Sulphur, molten	4.1	III	No data available
IMDG	UN2448	Sulfur, molten or Sulphur, molten	4.1	III	No data available

This product is not a Marine Pollutant as defined in *40 CFR Part 172.*

Pictograms for Hazard Classes

Special Precautions for User None specified

SECTION 15: REGULATORY INFORMATION

TSCA This product is listed on the TSCA Inventory at CAS Registry Number 7704-34-9.

CERCLA *Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)*
Hazardous substance: hydrogen sulfide 100 lbs. (45.4 kg)

SARA TITLE III *Superfund Amendments and Reauthorization Act, Title III*
Molten sulfur: fire hazard, reactive, immediate (acute) health hazard, delayed (chronic) health hazard

RCRA *Resource Conservation and Recovery Act*
Not subject to reporting because sulfur is not identified as a hazardous waste.

SECTION 16: OTHER INFORMATION

Last Revision Date 05/01/2015 **Preparation Date** 05/01/2015

Additional Information Molten sulfur may contain H_2S.
For additional information, contact your technical sales representative. For additional health and safety information, call Georgia Gulf Sulfur Corporation at 229-244-0000.

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