

Section 1: IDENTIFICATION

Product Name: Sulfur By Product (Superior)

Synonyms: Not available.

Product Use: Petrochemical industry: Petroleum refining.

Restrictions on Use: Not available.

Manufacturer/Supplier: Superior Refining Company, LLC
2407 Stinson Ave
Superior, WI 54880

Phone Number: 403-298-6111

Emergency Phone: Chemtrec: 1-800-424-9300
877-262-2111

Date of Preparation of SDS: September 25, 2017

Section 2: HAZARD(S) IDENTIFICATION**GHS INFORMATION**

Classification: Flammable Solids, Category 2
Skin Irritation, Category 2

LABEL ELEMENTS**Hazard****Pictogram(s):****Signal Word:** Warning

Hazard Statements: Flammable solid.
Causes skin irritation.

Precautionary Statements

Prevention: Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
Ground and bond container and receiving equipment.
Use explosion-proof electrical, ventilating, and lighting equipment.
Wash thoroughly after handling.
Wear protective gloves, protective clothing, eye protection and face protection.

Response: IF ON SKIN: Wash with plenty of water.
If skin irritation occurs: Get medical advice/attention.
Take off contaminated clothing and wash it before reuse.
In case of fire: Use dry chemical, CO₂, sand, earth, water spray or regular foam to extinguish.

Storage: Not applicable.

Disposal: Not applicable.

Hazards Not Otherwise Classified: Not applicable.

Ingredients with Unknown Toxicity: None.

This material is considered hazardous by the OSHA Hazard Communication Standard, (29 CFR 1910.1200).

This material is considered hazardous by the Hazardous Products Regulations.

Section 3: COMPOSITION / INFORMATION ON INGREDIENTS

Hazardous Ingredient(s)	Common name / Synonyms	CAS No.	% wt./wt.
Sulfur	Sulphur	7704-34-9	≥ 90
Hydrogen sulfide	Hydrogen sulphide	7783-06-4	≤ 0.1

Section 4: FIRST-AID MEASURES

Inhalation: If inhaled: Call a poison center or doctor if you feel unwell.

Acute and delayed symptoms and effects: May cause respiratory irritation. Signs/symptoms may include cough, sneezing, nasal discharge, headache, hoarseness, and nose and throat pain. This product contains small amounts of Hydrogen sulphide which may accumulate in confined spaces. Inhalation of Hydrogen sulphide may cause loss of sense of smell, major irritation of the respiratory tract, headache, nausea, vomiting, dizziness, and fluid buildup in the lungs (pulmonary edema), which can be fatal. At 300 ppm unconsciousness may occur after 20 minutes. From 300 to 500 ppm, death can occur within 1 to 4 hours of continuous exposure. At 500 ppm the respiratory system is paralyzed, the victim collapses almost instantaneously, and death can occur after exposure of only 30 to 60 minutes. Above 500 ppm Hydrogen sulphide may cause immediate loss of consciousness; death is rapid, and possibly immediate.

Eye Contact: If in eyes: Rinse cautiously with water for at least 30 minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a poison center or doctor.

Acute and delayed symptoms and effects: May cause eye irritation. Signs/symptoms may include redness, swelling, pain, tearing, and blurred or hazy vision. Hot liquid product may cause serious thermal burns on direct contact.

Skin Contact: If on skin (or hair): Rinse skin with water or shower. Get immediate medical advice/attention. Remove non-adhering contaminated clothing. Cool adherent materials and burned areas with ice and/or cold water. Do not remove adherent material or clothing. Wash contaminated clothing before reuse.

Acute and delayed symptoms and effects: Causes skin irritation. Signs/symptoms may include localized redness, swelling, and itching. Hot liquid product may cause serious thermal burns on direct contact.

Ingestion: If swallowed: Rinse mouth. Immediately call a poison center or doctor. If vomiting occurs naturally, have victim lean forward to reduce the risk of aspiration. Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person.

Acute and delayed symptoms and effects: Hot product may cause thermal burns. Signs/symptoms may include severe mouth, throat and abdominal pain, nausea, vomiting, and diarrhea, blood in the feces and/or vomitus may also be seen. Sulphur may be converted into Hydrogen sulphide in the intestine.

General Advice: In case of accident or if you feel unwell, seek medical advice immediately (show the label or SDS where possible).

Note to Physicians: Symptoms may not appear immediately. For inhalation of Hydrogen Sulphide, consider oxygen.

Section 5: FIRE-FIGHTING MEASURES

FLAMMABILITY AND EXPLOSION INFORMATION

Flammable solid. May be ignited by friction, heat, sparks or flames. Substance may be transported in a molten form at a temperature that may be above its flash point. May re-ignite after fire is extinguished. When heated, this material may evolve toxic and flammable Hydrogen sulphide.

If tank, rail car or tank truck is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions; also, consider initial evacuation for 800 meters (1/2 mile) in all directions.

Fire involving Tanks or Car/Trailer Loads: Cool containers with flooding quantities of water until well after fire is out. For massive fire, use unmanned hose holders or monitor nozzles; if this is impossible, withdraw from area and let fire burn. Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank. ALWAYS stay away from tanks engulfed in fire.

Sensitivity to Mechanical Impact: This material is not sensitive to mechanical impact.

Sensitivity to Static Discharge: This material is sensitive to static discharge.

MEANS OF EXTINCTION

Suitable Extinguishing Media: Small Fire: Dry chemical, CO₂, sand, earth, water spray or regular foam.

Large Fire: Water spray, fog or regular foam. Move containers from fire area if you can do it without risk.

Unsuitable Extinguishing Media: Do not spray water onto burning product as this may cause spattering and spreading of the flame. Not available.

Products of Combustion: Oxides of sulphur.

Protection of Firefighters: Fire may produce irritating and/or toxic gases. Contact may cause burns to skin and eyes. Contact with molten substance may cause severe burns to skin and eyes. Runoff from fire control may cause pollution. Hydrogen sulphide is heavier than air and may collect in low lying areas and confined spaces. Wear positive pressure self-contained breathing apparatus (SCBA). Structural firefighters' protective clothing will only provide limited protection.

Section 6: ACCIDENTAL RELEASE MEASURES

Emergency Procedures:	As an immediate precautionary measure, isolate spill or leak area for at least 25 meters (75 feet) in all directions. Keep unauthorized personnel away. Stay upwind. Keep out of low areas. ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area).
Personal Precautions:	Do not touch or walk through spilled material. Use personal protection recommended in Section 8. Don full-face, positive pressure, self-contained breathing apparatus.
Environmental Precautions:	Prevent entry into waterways, sewers, basements or confined areas.
Methods for Containment:	Stop leak if without risk. Contain hot liquid by dyking and allow to cool and solidify. Do not flush to sewer or allow to enter waterways.
Methods for Clean-Up:	Absorb or cover with dry earth, sand or other non-combustible material and transfer to containers.
Other Information:	See Section 13 for disposal considerations.

Section 7: HANDLING AND STORAGE**Handling:**

Do not swallow. Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. Ground and bond container and receiving equipment. Wash thoroughly after handling. Grounding of containers/pouring equipment is necessary when transferring hot liquid product. See Section 8 for information on Personal Protective Equipment.

Storage:

Store away from incompatible materials. See Section 10 for information on Incompatible Materials. Keep out of the reach of children. Head spaces in storage containers may contain toxic Hydrogen sulphide gas. Structural materials and lighting and ventilation systems should be corrosion resistant.

Section 8: EXPOSURE CONTROLS / PERSONAL PROTECTION**Exposure Guidelines****Component**

Sulphur [CAS No. 7704-34-9]

ACGIH: 10 mg/m³ (TWA) (Inhalable.); 3 mg/m³ (TWA) (Respirable.); For Particles (Insoluble or Poorly Soluble) Not Otherwise Specified

OSHA: 15 mg/m³ (Total dust) (TWA), 5 mg/m³ (Respirable fraction) (TWA); For Particulates Not Otherwise Regulated (PNOR).

Hydrogen sulphide [CAS No. 7783-06-4]

ACGIH: 1 ppm (TWA); 5 ppm (STEL); (2009);

OSHA: 20 ppm (C); 50 ppm (Peak) (Maximum duration: 10 mins. once only if no other meas. exp. occurs.)

10 ppm (TWA); 15 ppm (STEL) [Vacated];

TWA: Time-Weighted Average
STEL: Short-Term Exposure Limit
C: Ceiling

Engineering Controls: Use ventilation adequate to keep exposures (airborne levels of dust, fume, vapour, gas, etc.) below recommended exposure limits. Use explosion-proof electrical, ventilating, and lighting equipment.

PERSONAL PROTECTIVE EQUIPMENT (PPE)

Eye/Face Protection: Wear chemical safety goggles. If product is hot, wear full face-shield. Use equipment for eye protection that meets the standards referenced by CSA Standard CAN/CSA-Z94.3-92 and OSHA regulations in 29 CFR 1910.133 for Personal Protective Equipment.

Hand Protection: Wear protective gloves. If product is hot, thermally protective gloves are recommended. Consult manufacturer specifications for further information.

Skin and Body Protection: Wear protective clothing. Flame resistant clothing that meets the NFPA 2112 and CAN/CGSB 155.20 standards is recommended in areas where material is stored or handled. Clothing with full length sleeves and pants should be worn.

Respiratory Protection: If engineering controls and ventilation are not sufficient to control exposure to below the allowable limits then an appropriate NIOSH/MSHA approved air-purifying respirator that meets the requirements of CSA Standard CAN/CSA-Z94.4-11, or self-contained breathing apparatus must be used. Supplied air breathing apparatus must be used when oxygen concentrations are low or if airborne concentrations exceed the limits of the air-purifying respirators.

General Hygiene Considerations: Handle according to established industrial hygiene and safety practices. Consult a competent industrial hygienist to determine hazard potential and/or the PPE manufacturers to ensure adequate protection.

Section 9: PHYSICAL AND CHEMICAL PROPERTIES

Appearance: Solid. Mobile liquid at elevated temperatures.
Colour: Yellow to brownish-red.
Odour: Sulfurous to rotten eggs due to impurities.
Odour Threshold: 0.0047 ppm (Hydrogen sulphide)
Physical State: Liquid at high temperatures. Solid at ambient temperatures.

pH:	Not available.
Melting Point / Freezing Point:	118 °C (244.4 °F) (pure rhombic sulfur)
Initial Boiling Point:	Not available.
Boiling Range:	445 °C (833 °F)
Flash Point:	168 °C (334.4 °F) (PMCC)
Evaporation Rate:	Not available.
Flammability (solid, gas):	Not applicable.
Lower Flammability Limit:	35 g/m ³
Upper Flammability Limit:	1400 g/m ³
Vapor Pressure:	Not available.
Vapor Density:	8.9 (Air = 1)
Relative Density:	Not available.
Solubilities:	Insoluble in the following materials: cold water
Partition Coefficient: n-Octanol/Water:	Not available.
Auto-ignition Temperature:	232 °C (449.6 °F) (pure rhombic sulfur)
Decomposition Temperature:	Not available.
Viscosity:	Not available.
Percent Volatile, wt. %:	Not available.
VOC content, wt. %:	Not available.
Density:	Not available.
Coefficient of Water/Oil Distribution:	Not available.

Section 10: STABILITY AND REACTIVITY

Reactivity:	Contact with incompatible materials. Sources of ignition. Exposure to heat.
Chemical Stability:	Stable under normal storage conditions.
Possibility of Hazardous Reactions:	None known.
Conditions to Avoid:	Contact with incompatible materials. Sources of ignition. Exposure to heat.
Incompatible Materials:	Oxidizers. Alkali metals. Zinc. Halogens. Nitrates. Phosphorus. Ammonia.
Hazardous Decomposition Products:	Hazardous sulphur dioxide, and related oxides of sulphur may be generated upon combustion.

Section 11: TOXICOLOGICAL INFORMATION**EFFECTS OF ACUTE EXPOSURE****Product Toxicity****Oral:** Not available.**Dermal:** Not available.**Inhalation:** Not available.**Component Toxicity**

Component	CAS No.	LD ₅₀ oral	LD ₅₀ dermal	LC ₅₀
Sulphur	7704-34-9	> 8437 mg/kg (rat)	Not available.	Not available.
Hydrogen sulphide	7783-06-4	Not available.	Not available.	444 ppm (rat); 4H
Sulfur dioxide	7446-09-5	Not available.	Not available.	2520 ppm (rat); 1H

Likely Routes of Exposure: Eye contact. Skin contact. Inhalation. Ingestion.**Target Organs:** Skin. Eyes. Gastrointestinal tract. Respiratory system. Lungs. Blood. Cardiovascular system. Central nervous system.**Symptoms (including delayed and immediate effects)**

Inhalation: May cause respiratory irritation. Signs/symptoms may include cough, sneezing, nasal discharge, headache, hoarseness, and nose and throat pain. This product contains small amounts of Hydrogen sulphide which may accumulate in confined spaces. Inhalation of Hydrogen sulphide may cause loss of sense of smell, major irritation of the respiratory tract, headache, nausea, vomiting, dizziness, and fluid buildup in the lungs (pulmonary edema), which can be fatal. At 300 ppm unconsciousness may occur after 20 minutes. From 300 to 500 ppm, death can occur within 1 to 4 hours of continuous exposure. At 500 ppm the respiratory system is paralyzed, the victim collapses almost instantaneously, and death can occur after exposure of only 30 to 60 minutes. Above 500 ppm Hydrogen sulphide may cause immediate loss of consciousness; death is rapid, and possibly immediate. Inhalation of Sulphur dioxide at concentrations of approximately 6 ppm will result in eye, nose and throat irritation. Severe overexposure may result in death from systemic acidosis, pulmonary edema or from respiratory arrest. Prolonged or repeated inhalation of sulphur dioxide may cause impaired lung function, bronchitis, cough and fatigue.

Eye: May cause eye irritation. Signs/symptoms may include redness, swelling, pain, tearing, and blurred or hazy vision. Hot liquid product may cause serious thermal burns on direct contact.

Skin: Causes skin irritation. Signs/symptoms may include localized redness, swelling, and itching. Hot liquid product may cause serious thermal burns on direct contact.

Ingestion: Hot product may cause thermal burns. Signs/symptoms may include severe mouth, throat and abdominal pain, nausea, vomiting, and diarrhea, blood in the feces and/or vomitus may also be seen. Sulphur may be converted into Hydrogen sulphide in the intestine.

Skin Sensitization: Not available.

Respiratory Sensitization: Not available.

Medical Conditions Aggravated By Exposure: Not available.

EFFECTS OF CHRONIC EXPOSURE (from short and long-term exposure)

Target Organs: Skin. Eyes. Gastrointestinal tract. Respiratory system. Lungs. Blood. Cardiovascular system. Central nervous system.

Chronic Effects: Prolonged or repeated contact may dry skin and cause irritation. Hydrogen sulphide may reduce lung function; cause neurological effects such as headaches, nausea, depression and personality changes; eye and mucous membrane irritation; and damage to cardiovascular system.

Carcinogenicity: Product is not classified as a carcinogen. See Component Carcinogenicity table below for information on individual components.

Component Carcinogenicity

Component	ACGIH	IARC	NTP	OSHA	Prop 65
Sulfur dioxide	A4	Group 3	Not listed.	Not listed.	Not listed.

Mutagenicity: Not available.

Reproductive Effects: Not available.

Developmental Effects

Teratogenicity: Not available.

Embryotoxicity: Not available.

Toxicologically Synergistic Materials: Not available.

Section 12: ECOLOGICAL INFORMATION

Ecotoxicity:

Daphnia magna (Water flea, age <24 hr): EC50 >5000000 ug/L, 48-hr, freshwater, static; Effect: intoxication, immobilization;

Daphnia magna (Water flea, 1st instar larvae): EC50 = 3850000 ug/L, 96 hr, freshwater, static; Effect: intoxication, immobilization;

Americamysis bahia (Opossum Shrimp, age 24 hr): LC50 = 736000 ug/L, 96 hr (95% confidence interval: 646000-839000 ug/L), saltwater, static;

Lepomis macrochirus (Bluegill): LC50 < 14000 ug/L, 96 hr, freshwater, static;

Lepomis macrochirus (Bluegill, juvenile): LC50 > 180000 ug/L, 96 hr, freshwater, static;

Oncorhynchus mykiss (Rainbow trout): Concentration: LC50 > 180000 ug/L, 96 hr, freshwater, static.

Persistence / Degradability: Solid sulfur is biodegradable; microbiological reduction to hydrogen sulfide or oxidation to acidic oxy-sulfur species is possible. Both of these products can have environmental consequences. Reclamation of sulfur rich wastes is preferred over solid waste disposal. Commercial sulfur

waste reclaimers are available. Disposal must be in a certified landfill site approved for the use of elemental sulfur. Special simultaneous application of limestone normally required.

Bioaccumulation / Accumulation: Not anticipated to be bioaccumulative.

Mobility in Environment: Fugitive sulfur dust can be carried considerable distances from origin especially in low humidity and windy conditions. Prolonged exposure of soil and vegetation to such dust can be harmful.

Other Adverse Effects: Not available.

Section 13: DISPOSAL CONSIDERATIONS

Disposal Instructions: Disposal should be in accordance with applicable regional, national and local laws and regulations. Local regulations may be more stringent than regional or national requirements.

Section 14: TRANSPORT INFORMATION**U.S. Department of Transportation (DOT)**

Proper Shipping Name: UN2448, SULPHUR, MOLTEN, 4.1, PG III

Class: 4.1

UN Number: UN2448

Packing Group: III

Label Code:

**Canada Transportation of Dangerous Goods (TDG)**

Proper Shipping Name: UN2448, SULPHUR, MOLTEN, 4.1, PG III

Class: 4.1

UN Number: UN2448

Packing Group: III

Label Code:

**Section 15: REGULATORY INFORMATION****Chemical Inventories****US (TSCA)**

The components of this product are in compliance with the chemical notification requirements of TSCA.

Canada (DSL)

The components of this product are in compliance with the chemical notification requirements of the NSN Regulations under CEPA, 1999.

SUPERIOR REFINERY

SAFETY DATA SHEET

Sulfur By Product (Superior)

Date of Preparation: September 25, 2017

Federal Regulations**United States**

This SDS has been prepared to meet the U.S. OSHA Hazard Communication Standard, 29 CFR 1910.1200.

SARA Title III

Component	Section 302 (EHS) TPQ (lbs.)	Section 304 EHS RQ (lbs.)	CERCLA RQ (lbs.)	Section 313	RCRA CODE	CAA 112(r) TQ (lbs.)
Hydrogen sulphide	500	100	100	313	U135	10000

State Regulations**Massachusetts**

US Massachusetts Commonwealth's Right-to-Know Law (Appendix A to 105 Code of Massachusetts Regulations Section 670.000)

Component	CAS No.	RTK List
Sulphur	7704-34-9	Listed.
Hydrogen sulphide	7783-06-4	E

Note: E = Extraordinarily Hazardous Substance

New Jersey

US New Jersey Worker and Community Right-to-Know Act (New Jersey Statute Annotated Section 34:5A-5)

Component	CAS No.	RTK List
Sulphur	7704-34-9	Listed.
Hydrogen sulphide	7783-06-4	SHHS

Note: SHHS = Special Health Hazard Substance

Pennsylvania

US Pennsylvania Worker and Community Right-to-Know Law (34 Pa. Code Chap. 301-323)

Component	CAS No.	RTK List
Sulphur	7704-34-9	Listed.
Hydrogen sulphide	7783-06-4	E

Note: E = Environmental Hazard

California

California Prop 65: This product does not contain chemicals known to the State of California to cause cancer, birth defects or other reproductive harm.

Section 16: OTHER INFORMATION**Disclaimer:**

The information contained in this document applies to this specific material as supplied. It may not be valid for this material if it is used in combination with any other materials. It is the user's responsibility to satisfy oneself as to the suitability and completeness of this information for their own particular use.

Date of Preparation of SDS: September 25, 2017

Version: 1.0

GHS SDS Prepared by: Deerfoot Consulting Inc.

Phone: (403) 720-3700