

Safety Data Sheet (CANADA)

1. Identification

Product Identifier: Sulphur

Other Means of Identification: Sulfur, Solid Sulfur or Sulphur

Product use: As raw material in the manufacture of sulphuric acid, fertilizers, in rubber vulcanization, and other chemical processes

Restrictions on use: Do not use for non-industrial purpose

Manufacturer: Keyera and Affiliates




Address: Suite 600, Sunlife Plaza West
144 – 4th Avenue SW
Calgary, AB, T2P 3N4

MSDS Information: 1-780-449-7910

Emergency Contact (24 hours): 1-613-996-6666 (CANUTEC, Canada)
1-800-424-9300 (CHEMTREC, U.S.)

2. Hazards Identification

GHS Hazards

Pictogram	Classification	Hazard Statements
	Flammable Solids – Category 2	Flammable solid
	Eye Damage/Irritation – Category 2A Skin Corrosion/Irritation – Category 2	Causes serious eye irritation Causes skin irritation.
	Specific Target Organ Toxicity – Single Exposure – Category 1 Specific Target Organ Toxicity – Repeated Exposure – Category 2	Causes damage to respiratory system. May cause damage to respiratory system and/or skin through prolonged or repeated exposure.

Other Hazards

- sulphur dust suspended in air can be ignited easily by flame, sparks, or static electricity discharge.

Signal Word: Danger

Precautionary Statements:

Prevention

- Keep away from heat/sparks/open flames/hot surfaces – No smoking.
- Ground/Bond container and receiving equipment.
- Use explosion-proof ventilation equipment.

- Do not breathe dust.
- Wash skin thoroughly after handling.
- Do not eat, drink or smoke when using this product.

- Wear respiratory protection/protective gloves/ protective clothing/ eye protection/ face protection.

Response

- In case of fire: use dry chemical, CO₂, water spray or fire-fighting foam to extinguish.

- If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do so. Continue rinsing.
- If eye irritation persists: Get medical advice/attention.

- If on skin: Wash with plenty of water/shower.
- If skin irritation occurs: get medical advice/attention.
- Take off contaminated clothing and wash before reuse.

Storage

- Store locked up.

Disposal

- Dispose of contents/container in accordance with applicable local, provincial/state, and federal regulations.

3. Composition/Information on Ingredients

Chemical Name: Sulphur prill
Common Name/Synonyms: Sulphur, Solid Sulfur or Sulphur, Flaked Sulfur or Sulphur

Ingredient Name	Wt. %	CAS No.
Sulphur prills	100	7704-34-9
Hydrogen sulphide	Trace*	7783-06-4

Trace (1-5 ppm) of Hydrogen Sulphide **may** be degassed into the headspace

4. First Aid Measures

Immediate Medical Attention and Special Treatment:
 Treat symptomatically and supportively. Refer also to Table below.

First Aid:	
Inhalation:	If breathing is difficult, remove person to fresh air and keep comfortable for breathing. If experiencing respiratory symptoms: Call a doctor/physician.
Skin:	Wash with plenty of water/shower. If skin irritation occurs: get medical advice/attention.
Eyes:	Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do so. Continue rinsing. If eye irritation persists: Get medical advice/attention.
Ingestion:	Highly unlikely route of exposure. But if ingested, rinse mouth with cold water.

Most Important Effects and Symptoms, Acute or Delayed:
 Irritation of the eyes, skin and respiratory system, especially from the sulphur dust.

Exposure Route	Health Effects	Symptoms of Exposure
Skin	Irritation	Redness/pain
Eyes	Irritation	Redness/pain
Respiratory system	Irritation	Cough, running nose, difficulty in breathing

5. Fire Fighting Measures

<p>Flammability: Both the sulphur prills, and generated sulphur dust suspended in air can be ignited easily by flame, sparks, or static electricity discharge.</p>	<p>Hazardous Combustion Products: May include carbon monoxide (CO), carbon dioxide (CO₂), and sulphur dioxide (SO₂), which has the odor of burning match-heads.</p>
<p>Sensitive to impact: No.</p>	<p>Sensitive to static discharge: No.</p>
<p>Extinguishing Media: Small Fire: Dry chemical, CO₂, sand, earth, water spray or regular foam. Large Fire: Water spray, fog or regular foam.</p>	
<p>Unsuitable Extinguishing Media:</p> <ul style="list-style-type: none"> • Water or foam may cause frothing of molten sulphur, causing boil over. 	
<p>Special Protective Equipment for Firefighters:</p> <ul style="list-style-type: none"> • Wear full protective clothing and NIOSH-approved SCBA with full face-piece. 	
<p>Precautions for Firefighters:</p> <ul style="list-style-type: none"> • During a fire, the sulphur prills may melt to form molten sulphur which may cause severe thermal skin burns and eye damage. • This highly flammable solid must be kept from sparks, open flame, hot surfaces, and all sources of ignition and heat. • Move container from fire area if you can do it without risk. • Apply cooling water to sides of containers that are exposed to flames until well after fire is out. • Stay away from ends of tanks. • 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 device or any discoloration of tank due to fire. • Cool fire-exposed containers with flooding quantities of water applied from as far a distance as possible. • Consider evacuation of downwind area if material is leaking. • 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. • See Guide 133, Emergency Response Guidebook (Transp. Can/US Dept. of Transp.). 	
<p>Unusual Fire and Explosion Hazards:</p> <ul style="list-style-type: none"> • Can form explosive mixtures with oxidizers (e.g. acid, chlorine). • Sulphur burns with a blue flame which may be difficult to see in daylight. • During a fire, the sulphur prills may melt to form molten sulphur, which may produce frothing when mixed with water or foam; steam explosions may also occur when mixing water with molten sulphur. 	

6. Accidental Release Measures

Protective Equipment:

Gloves: Recommended: rubber or neoprene gloves. Not recommended: PVC, latex.

Clothing: Flame-retardant e.g. Nomex, Proban.

Respirator: A SABA (Supplied Air Breathing Apparatus) or SCBA (Self-Contained Breathing Apparatus) is required if there is a potential for uncontrolled release, exposure levels are unknown, or any other circumstance exists where an air-purifying respirator may not provide adequate protection. Where appropriate, a NIOSH/MSHA approved air-purifying respirator with dust cartridges and acid gas cartridges can be used. When assessing the proper type of respiratory protection, also consider the occupational exposure limits applicable to individual ingredients.

Eye: Safety glasses, or chemical goggles if dust is present.

Precautions:

- Sulphur itself is relatively non-toxic to humans, causing mild local irritation to the eyes, nose, throat and upper airways. However, hot molten sulphur may cause severe thermal skin burns and eye damage.
- Beware that water or foam may cause frothing of molten sulphur, with further application leading to boil over, and steam explosions may occur when mixing water with molten sulphur.

Emergency Procedures:

- Shut off leak/release source, if it can be done safely.
- Remove all sources of ignition.
- Isolate hazard area.
- Evacuate area of all unnecessary personnel.
 Small spill: consider downwind evacuation of at least 10-25 meters (30-80 feet)
 Large spill: consider downwind evacuation of at least 100 meters (330 feet)
 If tank, rail car or tank truck is involved in a fire, evacuate in all directions of at least 800 meters (1/2 mile).
- Keep unnecessary and unprotected personnel from entering.
- Emergency personnel must wear appropriate personal protective equipment.
- Ventilate area of spill to prevent generation of flammable dust.

Containment and Clean-up:

- Use non-sparking tools and equipment.
- Use booms/pillows to prevent entry into storm sewers and ditches that lead to waterways.
- When possible, recover spilled/released sulphur prills into appropriate container (e.g. for chemical waste).
- Do not use combustible materials, such as sawdust, as absorbent.
- Refer to Guide 133 of the Emergency Response Guidebook (Transport Canada/US Dept. of Transportation).

7. Handling and Storage

Handling Precautions :

- Sulphur dust is explosive. See “Engineering Control” in Section 8.
- Use only in a well ventilated area.
- Keep away from heat/sparks/open flames/hot surfaces – No smoking.
- Avoid contact with eyes, skin, and clothing.
- Avoid ingestion and inhalation.
- Wear protective gloves/clothing and eye/face protection:
- Use only non-sparking tools and explosion-proof ventilation equipment.
- Take precautionary measures against static discharge.
- Ground/bond containers and equipment when transferring material.

Storage Precautions:

Locations

- Store in a cool, dry, well-ventilated location, away from any area of fire-hazard.
- Outside or detached storage is preferred.
- Storage and use areas should be No Smoking areas.
- Ventilation system must be explosion-proof.

Containers

- Containers should be grounded.
- Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product.
- Do not attempt to clean empty containers since residue is difficult to remove.
- Do not pressurize, cut, weld, braze, solder, drill, grind or expose such containers to heat, sparks, flame, static electricity or other sources of ignition: they may explode and cause injury or death

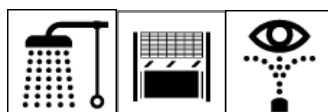
Other precautions

- Separate from incompatibles like oxidizers e.g. bromates, chlorates, chromates, hypochlorites, perchlorates, peroxides, nitrates, nitrites.

8. Exposure Controls / Personal Protection

EXPOSURE LIMITS

	Authority	15 MINS STEL or Ceiling	8-HOURS
Sulphur (CAS 7704-34-9) as nuisance dust	Alberta, Ontario, BC	-	10 mg/m ³
Hydrogen sulphide (CAS 7783-06-4)	Alberta, Ontario	15 ppm (21 mg/m ³) Ceiling	10 ppm (14 mg/m ³)
	BC	10 ppm (14 mg/m ³) Ceiling	-



ENGINEERING CONTROLS


- Engineering control methods to reduce hazardous exposures are preferred. Methods include mechanical ventilation, process or personal enclosure, control or process conditions, and process modification.
- Ventilate area (mechanical general and/or local exhaust ventilation) where product is used, stored and/or handled to maintain airborne concentration of potential H₂S below the LEL and OEL, especially in confined spaces.
- Dust collectors should be located outdoors and equipped with explosion relief vents or explosion suppression systems. Refer to NFPA 655 for prevention of sulphur fires and explosions.
- Ventilation system must be explosion proof, grounded and separate from other exhaust ventilation systems.
- Supply sufficient replacement air to make up for air removed by exhaust systems.



PERSONAL PROTECTIVE EQUIPMENT

- Gloves: Recommended: rubber or neoprene gloves. Not recommended: PVC, latex.
- Clothing: Flame-retardant e.g. Nomex, Proban.
- Respirator: A SABA (Supplied Air Breathing Apparatus) or SCBA (Self-Contained Breathing Apparatus) is required if there is a potential for uncontrolled release, exposure levels are unknown, or any other circumstance exists where an air-purifying respirator may not provide adequate protection. Where appropriate, a NIOSH/MSHA approved air-purifying respirator with dust cartridges and acid gas cartridges can be used. When assessing the proper type of respiratory protection, also consider the occupational exposure limits applicable to individual ingredients.
- Eye: Safety glasses, or chemical goggles if dust is present.

9. Physical and Chemical Properties

Chemical Formula: S or S ₈	Molecular Weight: 32.0 g/mole	Chemical Family: Non-metallic element
Appearance: Yellow flakes, prills, granules 	Odor: Odorless; rotten egg odor if hydrogen sulphide is present	Odor Threshold: ~0.01-0.005 ppm (for H ₂ S) NOT Sulphur
pH: Not applicable	Freezing/Melting Point: 113 – 120°C (235.4 – 248°F)	Boiling Point: 445°C (833°F)
Boiling Range: Not available	Flashpoint and Method: 207°C (405°F) Cleveland Open Cup	Flammability: Yes
Upper-Lower Explosive Limit: 1400 g/m ³ - 35 g/m ³ (as dust)	Bulk Density: 1.330 tonnes/m ³ (83 lbs/ft ³)	Viscosity: Not available
Specific Gravity: 2.07 @ 20°C (68°F)	Percent Soluble (@25°C): Insoluble in water Slightly soluble in alcohol, ether, chloroform, toluene and benzene. Very soluble in carbon disulphide	
Partition Coefficient n-octanol/water: Not Available	Auto-Ignition Temperature: 232°C (449.6°F)	Decomposition Temp.: Not available.
Vapor Pressure: <0.0001 mmHg @ 20°C (68°F)	Vapor density: Not available	Evaporation Rate: Not available

10. Stability and Reactivity

Reactivity: Avoid incompatible materials: may react violently with oxidizers.
Chemical Stability: Stable under normal temperatures and pressures.
Possibility of Hazardous Reactions: Polymerization has not been reported to occur under normal temperature and pressure conditions.
Conditions to Avoid: Keep away from heat/sparks/open flames/hot surfaces and incompatible materials.
Incompatible Materials: <ul style="list-style-type: none"> • Reacts violently with oxidizing agents such as perchlorates, peroxides, permanganates, nitrates and halogens (chlorine, bromine, fluorine, iodine). • Reacts with hydrocarbons to form carbon disulphides and hydrogen sulphides. • Can react with metals such as sodium, calcium, tin, nickel or zinc under certain conditions.
Hazardous Decomposition Products: No decomposition if stored and applied as directed. Combustion products may include sulphur dioxide SO ₂ .

11. Toxicological Information

Exposure Route	Acute Health Effects	Symptoms of Exposure
Inhalation:	May cause irritation of the nose, throat and lungs	Cough, running nose, difficulty in breathing
Skin:	Irritation	Redness and pain
Eye:	Irritation (e.g. from dust)	Redness and pain
Ingestion:	No a likely exposure route	

Chronic Exposure:

Allergic skin response after repeated and prolonged contact have been reported, but are not common.

Ingestion and Inhalation:

Repeated or prolonged exposure to dusts may cause irritation to the mucous membranes. Bronchi-pulmonary disease may occur which, after several years, may be complicated by emphysema and bronchiectasis. Early symptoms in sulphur miners often include upper respiratory tract catarrh (inflammation of the mucous membrane), with cough and expectoration which is mucoid and may even contain granules of sulphur. Asthma is a frequent complication.

Sensitization:

Not known to be a skin-sensitizer. Allergic skin response after repeated and prolonged contact have been reported, but are not common.

Reproductive Toxicology: Not known to occur	Teratogenicity: No	Mutagenicity: No
Carcinogenicity: Not listed by ACGIH, IARC, NIOSH, NTP, or OSHA	Irritancy: Irritant to eyes, nose, throat, gastrointestinal tract & skin	Target Organs: Eyes, skin, respiratory system

Lethality Tests:

Chemical Name	CAS No.	LD50	LC50
Sulphur	7704-34-9	Rabbit, dermal >2000 mg/kg Rat, oral >3000 mg/kg	Rat, inhalation >9.23 mg/L, 4 hrs.

12. Ecological Information

Persistence & Degradability: No data available.	Bioaccumulative Potential: No.
Mobility: No data available.	Other Adverse Effects: No data available.

As sulphur is insoluble in water at 20°C, there is minimal immediate risk from spills. However, sulphur can oxidize under certain conditions to form acidic runoffs. Spilled sulphur should therefore be contained/recovered, and kept away from drainage and waterways.

Eco Toxicity Tests

Chemical Name	CAS No.	Species	Test Method	LC50/ EC50/
Sulphur	7704-34-9	Brachydanio rerio (Zebra Dariio fish)	Static test; 96 hrs.	LC50 = 866 mg/L
		Lepomis macrochirus (Bluegill fish)	Static test; 96 hrs.	LC50 < 14 mg/L
		Oncorhynchus mykiss (Rainbow Trout)	Static test; 96 hrs.	LC50 > 180 mg/L

13. Disposal Considerations

Waste Disposal:

- Dispose of waste material at an approved (hazardous) waste treatment/disposal facility in accordance with applicable local, provincial, and federal regulations.
- Do not dispose of waste with normal garbage, or to sewer systems.

14. Transport Information

TDG (CANADA) CLASSIFICATION

PROPER SHIPPING NAME: Sulphur

TDG CLASS: 4.1

PACKING GROUP: III

UN NUMBER: UN1350

LABEL/PLACARD



Sulphur/Sulfur, in prills, granules, pellets, pastilles or flakes form meeting special Provision 33 are not regulated under TDG

TDG Special Provision 33:

- 33.** These Regulations do not apply to these dangerous goods if the dangerous goods
- (a) are in a quantity less than or equal to 400 kg per means of containment; or
 - (b) have been formed to a specific shape such as prills, granules, pellets, pastilles or flakes.

UN1350

15. Regulatory Information

CANADA

Regulatory List	Chemical
DSL Domestic Substance List	Sulphur (CAS 7704-34-9) is on the DSL
E2 Environmental Emergencies	Sulphur (CAS 7704-34-9) is <u>not</u> on the E2 Substance list
NPRI National Pollutant Release Inventory	Sulphur (CAS 7704-34-9) is <u>not</u> on the NPRI list

16. Other Information

NFPA Hazard Rating:

Health 2, Flammability 1, Instability 0



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Revisions:

- Original
- 1st revision
- 2nd revision
- 3rd revision

Dates:

January 3, 2011
 October 31, 2013
 June 30, 2015
 August 31, 2015

Main Changes

By Deerfoot Consultant
 format and general content changes
 GHS/ WHMIS 2015 format
 Change emergency contact number

Glossary

ACGIH – American Conference of Governmental Industrial Hygiene
DOT – US Department of Transportation
DSL – Domestic Substance List (Canada)
E2 – Environmental Emergencies (Canada)
GHS – Globally Harmonized System
IARC – International Agency for Research on Cancer
IDLH – Immediately Dangerous to Life and Health
NIOSH – National Institute for Occupational Safety & Health
NPRI – National Pollutant Release Inventory (Canada)
NTP – National Toxicology Program
OSHA – Occupational Safety & Health Administration of the US Dept of Labour
PEL – Permissible Exposure Limit
SARA – Superfund Amendments and Reauthorization Act of 1986
STEL – Short Term Exposure Limit
TRI – US Toxic Release Inventory
TSCA – Toxic Substance Control Act
TWA – Time Weighed Average

Disclaimer of Expressed and Implied Warranties

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~ End of Safety Data Sheet ~