Sulphur, Solid (Canada)

Safety Data Sheet

Section 1: Identification of the substance or mixture and of the supplier

Product Name: Sulphur, Solid (Canada)
SDS Number: 778933

Synonyms/Other Means of Identification:
Sulphur
Brimstone
Elemental Sulphur
Formed Sulphur
Soil Sulphur
Sulphur Cake

Intended Use: Feedstock

Manufacturer:
ConocoPhillips Canada Limited or its Affiliates
PO Box 130, 401 9th Ave. SW
Calgary, Alberta T2P 2H7 Canada

Emergency Health and Safety Number:
Chemtrec: 800-424-9300 (24 Hours)
CANUTEC (613) 996-6666

Customer Service: 403-233-4000

Technical Information: 403-233-4000

SDS Information:
Phone: 855-244-0762
Email: SDS@conocophillips.com
URL: www.conocophillips.com

Section 2: Hazard(s) Identification

Classification
H315 -- Skin corrosion/irritation -- Category 2
H332 -- Acute toxicity, Inhalation -- Category 4

Hazards not Otherwise Classified
Contains poisonous hydrogen sulfide gas

Label Elements

WARNING
May form combustible dust concentrations in enclosed spaces during handling
Causes skin irritation. (H315)*
Contains poisonous hydrogen sulfide gas
Harmful if inhaled. (H332)*

Precautionary Statement(s):
Avoid breathing dust/fume/gas/mist/vapours/spray. (P261)*
Use only outdoors or in a well-ventilated area. (P271)*
Wear protective gloves / protective clothing / eye protection / face protection. (P280)*
IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. (P304+P340)*
Call a POISON CENTER or doctor/physician if you feel unwell. (P312)*
Wash thoroughly after handling. (P264)*
IF ON SKIN: Rinse skin with water/shower. (P353)*
If skin irritation occurs: Get medical advice/attention. (P313)*
Take off contaminated clothing and wash before reuse. (P362)*

** (Applicable GHS hazard code.)*

Section 3: Composition / Information on Ingredients

Component	CASRN	Concentration[1]
Sulfur	7704-34-9	95-100
Hydrogen Sulfide	7783-06-4	0-5

[1] All concentrations are percent by weight unless ingredient is a gas. Gas concentrations are in percent by volume.

Section 4: First Aid Measures

Eye Contact: If irritation or redness develops from exposure, flush eyes with clean water. If symptoms persist, seek medical attention.

Skin Contact: Remove contaminated shoes and clothing, and flush affected area(s) with large amounts of water. If skin surface is damaged, apply a clean dressing and seek medical attention. If skin surface is not damaged, cleanse affected area(s) thoroughly by washing with mild soap and water or a waterless hand cleaner. If irritation or redness develops, seek medical attention. Wash contaminated clothing before reuse.

Inhalation (Breathing): Immediately move victim away from exposure and into fresh air in a position comfortable for breathing. If respiratory symptoms or other symptoms of exposure develop, seek immediate medical attention. If victim is not breathing, clear airway and immediately begin artificial respiration. If breathing difficulties develop, oxygen should be administered by qualified personnel. Seek immediate medical attention.

Ingestion (Swallowing): First aid is not normally required; however, if swallowed and symptoms develop, seek medical attention.

Most important symptoms and effects

Acute: None known or anticipated.

Delayed: None known or anticipated.

Notes to Physician: At high concentrations hydrogen sulfide may produce pulmonary edema, respiratory depression, and/or respiratory paralysis. The first priority in treatment should be the establishment of adequate ventilation and the administration of 100% oxygen. Animal studies suggest that nitrites are a useful antidote, however, documentation of the efficacy of nitrites in humans is lacking. If the diagnosis of hydrogen sulfide poisoning is confirmed and if the patient does not respond rapidly to supportive care, the use of nitrites may be an effective antidote if delivered within the first few minutes of exposure. For adults the dose is 10 mL of a 3% NaNO2 solution (0.5 gm NaNO2 in 15 mL water) I.V. over 2-4 minutes. The dosage should be adjusted in children or in the presence of anemia, and methemoglobin levels, arterial blood gases, and electrolytes should be monitored closely.

Other Comments: Before attempting rescue, first responders should be alert to the possible presence of hydrogen sulfide, a poisonous gas with the smell of rotten eggs, and should consider the need for respiratory protection (see Section 8). Remove casualty to fresh air as quickly as possible. Immediately begin artificial respiration if breathing has ceased. Consider whether oxygen administration is needed. Obtain medical advice for further treatment.

Section 5: Fire-Fighting Measures

NFPA 704 Hazard Class

Health: 3 **Flammability:** 1 **Instability:** 0 (0-Minimal, 1-Slight, 2-Moderate, 3-Serious, 4-Severe)

Unusual Fire & Explosion Hazards: Flash point varies depending on the impurities present in the product. Sulfur burns easily in air when ignited by flame or excess heat. Solid material may burn, but will not ignite readily. Dust may form an explosive mixture with air. Sulfur can form explosive mixtures with oxidizers (see Section 10). Avoid generating dust; fine dust dispersed in air in sufficient concentrations, and in the presence of an ignition source is a potential dust explosion hazard. Hazardous combustion/decomposition products, including hydrogen sulfide, may be released by this material when exposed to heat or fire. Use caution and wear protective clothing, including respiratory protection.

Extinguishing Media: Dry chemical, carbon dioxide, foam, water spray, sand or earth is recommended. Carbon dioxide can displace oxygen. Use caution when applying carbon dioxide in confined spaces.

Fire Fighting Instructions: For fires beyond the initial stage, emergency responders in the immediate hazard area should wear protective clothing. When the potential chemical hazard is unknown, in enclosed or confined spaces, a self contained breathing apparatus should be worn. In addition, wear other appropriate protective equipment as conditions warrant (see Section 8).

Isolate immediate hazard area and keep unauthorized personnel out. Contain spill if it can be done safely. Move undamaged containers from immediate hazard area if it can be done safely. Cool equipment exposed to fire with water, if it can be done safely.

Hazardous Combustion Products: Combstion may yield sulfur dioxide and other oxides of sulfur.

See Section 9 for Flammable Properties including Flash Point and Flammable (Explosive) Limits

Section 6: Accidental Release Measures

Personal Precautions: This material may burn, but will not ignite readily. Avoid creating dust. Keep all sources of ignition away from spill/release. Contains poisonous hydrogen sulfide gas. If the presence of dangerous amounts of H2S around the spilled product is suspected, additional or special actions may be warranted, including access restrictions and use of protective equipment. Stay upwind and away from spill/release. Avoid direct contact with material. For large spillages, notify persons down wind of the spill/release, isolate immediate hazard area and keep unauthorized personnel out. Wear appropriate protective equipment, including respiratory protection, as conditions warrant (see Section 8). See Sections 2 and 7 for additional information on hazards and precautionary measures.

Environmental Precautions: Contain spill if it can be done safely. Prevent spilled material from entering sewers, storm drains, other unauthorized drainage systems, and natural waterways. Use water sparingly to minimize environmental contamination and reduce disposal requirements. If spill occurs on water notify appropriate authorities and advise shipping of any hazard. If spill/release in excess of EPA reportable quantity (see Section 15) is made into the environment, immediately notify the National Response Center (phone number 800-424-8802).

Methods for Containment and Clean-Up: Clean up spills in a manner that does not disperse dust into air. Use non-sparking tools and equipment. Reduce airborne dust and prevent scattering by moistening with water. Notify relevant authorities in accordance with all applicable regulations. Carefully shovel or sweep up spilled material and place in a suitable container. Minimize dust generation.

Recommended measures are based on the most likely spillage scenarios for this material; however local conditions and regulations may influence or limit the choice of appropriate actions to be taken. See Section 13 for information on appropriate disposal.

Section 7: Handling and Storage

Precautions for safe handling: Under dusty conditions, avoid all sources of ignition, including sparks and static electricity. Minimize dust generation and accumulation in enclosed spaces. Routine housekeeping should be instituted to ensure that dusts do not accumulate on surfaces. Cleaning methods (e.g. compressed air) which can generate potentially combustible dust clouds should not be used. May contain or release dangerous levels of hydrogen sulfide. Do not breathe gas. Use only outdoors or in well-ventilated area. Wear protective gloves/clothing and eye/face protection. Wash thoroughly after handling. Use good personal hygiene practices and wear appropriate personal protective equipment (see section 8).

Do not wear contaminated clothing or shoes.

Conditions for safe storage: Keep container(s) tightly closed and properly labeled. This material may contain or release poisonous hydrogen sulfide gas. In a tank, barge, or other closed container, the vapor space above this material may accumulate hazardous concentrations of hydrogen sulfide. Check atmosphere for oxygen content, H2S, and flammability prior to entry. Soil Sulfur bulk storage bins and handling equipment should have large openings to minimize bridging. Bin walls should be designed to carry the loading of the material. Steel and concrete are suitable materials of construction if properly coated.

Soil sulfur can contain residual moisture. Store away from other materials that may be damaged by moisture. Slabs should be designed to drain moisture away from the product. Use and store this material in cool, dry, well-ventilated area away from heat and all sources of ignition. Store only in approved containers. Keep away from any incompatible material (see Section 10). Protect container(s) against physical damage.

Section 8: Exposure Controls / Personal Protection

Component	ACGIH	OSHA	Other
Sulfur	TWA:10 mg/m^3 TWA-Total 3 mg/m^3-Resp. as Nuisance Dust, If Generated	TWA: 15 mg/m^3 -Total TWA: 5 mg/m^3 -Resp. as Nuisance Dust, If Generated	---
Hydrogen Sulfide	STEL: 5 ppm TWA: 1 ppm	Ceiling: 20 ppm	TWA: 5 ppm 8hr TWA: 2.5 ppm 12hr STEL: 15 ppm (ConocoPhillips Guidelines)

Note: State, local or other agencies or advisory groups may have established more stringent limits. Consult an industrial hygienist or similar professional, or your local agencies, for further information.

Engineering controls: If current ventilation practices are not adequate to maintain airborne concentrations below the established exposure limits, additional engineering controls may be required. It is recommended that all dust control equipment such as local exhaust ventilation and material transport systems involved in handling of this product contain explosion relief vents or an explosion suppression system or an oxygen deficient environment. Ensure that dust-handling systems (such as exhaust ducts, dust collectors, vessels, and processing equipment) are designed in a manner to prevent the escape of dust into enclosed work areas (i.e., there is no leakage from the equipment).

Eye/Face Protection: The use of eye protection that meets or exceeds ANSI Z.87.1 is recommended to protect against potential eye contact, irritation, or injury. Depending on conditions of use, a face shield may be necessary.

Skin/Hand Protection: The use of gloves impervious to the specific material handled is advised to prevent skin contact. Users should check with manufacturers to confirm the breakthrough performance of their products. Depending on exposure and use conditions, additional protection may be necessary to prevent skin contact including use of items such as chemical resistant boots, aprons, arm covers, hoods, coveralls, or encapsulated suits. Suggested protective materials: Nitrile

Respiratory Protection: Where there is potential for airborne exposure to hydrogen sulfide (H2S) above exposure limits, a NIOSH approved, self-contained breathing apparatus (SCBA) or equivalent operated in a pressure demand or other positive pressure mode should be used. Under conditions where hydrogen sulfide (H2S) is NOT detected, a NIOSH certified air purifying respirator equipped with R or P95 filters may be used.

A respiratory protection program that meets or is equivalent to OSHA 29 CFR 1910.134 and ANSI Z88.2 should be followed whenever workplace conditions warrant a respirator's use. Air purifying respirators provide limited protection and cannot be used in atmospheres that exceed the maximum use concentration (as directed by regulation or the manufacturer's instructions), in oxygen deficient (less than 19.5 percent oxygen) situations, or under conditions that are immediately dangerous to life and health (IDLH).

Other Protective Equipment: Eye wash and quick-drench shower facilities should be available in the work area. Thoroughly clean shoes and wash contaminated clothing before reuse.

Suggestions provided in this section for exposure control and specific types of protective equipment are based on readily available information. Users should consult with the specific manufacturer to confirm the performance of their protective equipment. Specific situations may require consultation with industrial hygiene, safety, or engineering professionals.

Section 9: Physical and Chemical Properties

Note: Unless otherwise stated, values are determined at 20°C (68°F) and 760 mm Hg (1 atm). Data represent typical values and are not intended to be specifications.

Appearance:	Bright yellow
Physical Form:	Solid
Odor:	Rotten egg / sulfurous
Odor Threshold:	No data
pH:	Not applicable
Vapor Pressure:	1mm Hg @ 363°F / 184°C
Vapor Density (air=1):	> 38.9
Initial Boiling Point/Range:	833 °F / 445 °C
Melting/Freezing Point:	246 °F / 119 °C
Solubility in Water:	Insoluble
Partition Coefficient (n-octanol/water) (Kow):	No data
Specific Gravity (water=1):	1.8 @ 68ºF / 20ºC
Evaporation Rate (nBuAc=1):	No data
Flash Point:	405 °F / 207 °C
Test Method:	Cleveland Open Cup (COC), ASTM D92
Lower Explosive Limits (vol % in air):	35 g/m^3 as dust
Upper Explosive Limits (vol % in air):	1,400 g/m^3 as dust
Auto-ignition Temperature:	450 °F / 232 °C

Section 10: Stability and Reactivity

Stability: Stable under normal ambient and anticipated conditions of use.

Conditions to Avoid: Avoid all possible sources of ignition. Avoid overheating.

Materials to Avoid (Incompatible Materials): Elemental sulfur can react with metals such as sodium, calcium, tin, nickel, or zinc under certain conditions. Avoid contact with strong oxidizing agents such as acids, chlorine, dichromates, or permanganates.

Hazardous Decomposition Products: Thermal decomposition can release toxic vapors or gases.

Hazardous Polymerization: Not known to occur.

Section 11: Toxicological Information

Information on Toxicological Effects of Substance/Mixture

Acute Toxicity	Hazard	Additional Information	LC50/LD50 Data
Inhalation	Harmful if inhaled	Contains poisonous hydrogen sulfide gas. See Signs and Symptoms.	>1 mg/L (dust, estimated)
Skin Absorption	Unlikely to be harmful		> 2g/kg
Ingestion (Swallowing)	Unlikely to be harmful		> 8.4 g/kg

Aspiration Hazard: Not applicable

Skin Corrosion/Irritation: Causes skin irritation.

Serious Eye Damage/Irritation: Causes mild eye irritation.

Signs and Symptoms: Effects of overexposure may include irritation of the digestive tract, irritation of the respiratory tract, headaches, coughing, runny nose, vomiting, diarrhea, shortness of breath, abdominal pain and chest pain.

This material contains hydrogen sulfide, a poisonous gas with the smell of rotten eggs. The smell disappears rapidly because of olfactory fatigue so odor may not be a reliable indicator of exposure. Effects of overexposure include irritation of the eyes, nose, throat and respiratory tract, blurred vision, photophobia (sensitivity to light), and pulmonary edema (fluid accumulation in the lungs). Severe exposures can result in nausea, vomiting, muscle weakness or cramps, headache, disorientation and other signs of nervous system depression, irregular heartbeats, convulsions, respiratory failure, and death.

Skin Sensitization: No information available on the mixture, however none of the components have been classified for skin sensitization (or are below the concentration threshold for classification). Allergic skin responses after repeated contact with sulfur have been reported but are not common

Respiratory Sensitization: No information available.

Specific Target Organ Toxicity (Single Exposure): Not expected to cause organ effects from single exposure.

Specific Target Organ Toxicity (Repeated Exposure): Not expected to cause organ effects from repeated exposure.

Carcinogenicity: No information available on the mixture, however none of the components have been classified for carcinogenicity (or are below the concentration threshold for classification) . This substance is not listed as a carcinogen by IARC, NTP or OSHA.

Germ Cell Mutagenicity: No information available on the mixture, however none of the components have been classified for germ cell mutagenicity (or are below the concentration threshold for classification).

Reproductive Toxicity: No information available on the mixture, however none of the components have been classified for reproductive toxicity (or are below the concentration threshold for classification).

Section 12: Ecological Information

Toxicity: Sulfur is not classified as an environmental hazard. In six studies on ecological effects (involving bobwhite quail, two fish species, daphnia, mysid shrimp and honey bees), sulfur has been shown to be practically non-toxic to the species tested. While there is potential for non-target organisms to be exposed to sulfur, little hazard to these species is expected to result. Classification: No classified hazards.

Persistence and Degradability: Sulfur is a component of the environment, and there is a natural cycle of oxidation and reduction reactions which transforms sulfur into both organic and inorganic products. Sulfur is amenable to microbial utilization. Therefore, this material can be degraded by microorganisms and is regarded as inherently biodegradable.

Bioaccumulative Potential: Sulfur is not expected to have bioaccumulation or food chain contamination potential.

Mobility in Soil: Sulfuric acid is miscible with water. It will not adsorb to particulate matter or surfaces and is expected to have high mobility in soil and sediments.

Other Adverse Effects: None anticipated.

Section 13: Disposal Considerations

The generator of a waste is always responsible for making proper hazardous waste determinations and needs to consider state and local requirements in addition to federal regulations.

This material, if discarded as produced, would not be a federally regulated RCRA "listed" hazardous waste and is not believed to exhibit characteristics of hazardous waste. See Sections 7 and 8 for information on handling, storage and personal protection and Section 9 for physical/chemical properties. It is possible that the material as produced contains constituents which are not required to be listed in the MSDS but could affect the hazardous waste determination. Additionally, use which results in chemical or physical change of this material could subject it to regulation as a hazardous waste.

Container contents should be completely used and containers should be emptied prior to discard.

Section 14: Transport Information

Canadian (TDG)

Shipping Description: UN1350, Sulphur, 4.1; , III
Small Means of Containment
Package Marking: Sulphur, UN1350
Package Labeling: Class 4.1, Flammable solid
Large Means of Containment
Package Placard/Marking: Class 4.1 / 1350
ERAP Index: None
Emergency Response Guide: 133

Note: ***Solid sulphur is not regulated if transported in quantities less than 400 kg per means of containment or if formed to a specific shape, such as prills, granules, pellets, pastilles or flakes. TDG Regulations Schedule 2, Special Provision 33***

U.S. Department of Transportation (DOT)

Shipping Description: UN1350, Sulfur, 4.1; , III
Non-Bulk Package Marking: None
Non-Bulk Package Labeling: None
Bulk Package/Placard Marking: Flammable solid / 1350
Packaging - References: None; None; 49 CFR 173.240
(Exceptions; Non-bulk; Bulk)
Hazardous Substance: See Section 15 for RQ`s
Emergency Response Guide: 133
Note: ***Solid sulfur is not regulated if transported in non-bulk packaging or if formed to a specific shape, such as prills, granules, pellets, pastilles, or flakes. [49CFR 172.102, Special Provision 30]***
If shipment is domestic only, may be shipped as:
Shipping Name: NA1350, Sulfur, 9, III
Placard / Marking: None / 1350 or Class 9 / 1350
The following alternate shipping description order may be used until January 1, 2013:
Proper Shipping name, Hazard Class or Division, (Subsidiary Hazard if any), UN or NA number, Packing Group
Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code: *Not applicable*
Other shipping description elements may be required for DOT compliance.

International Maritime Dangerous Goods (IMDG)

Shipping Description: UN1350, Sulphur, 4.1, III
Non-Bulk Package Marking: Sulphur, UN1350
Labels: Flammable solids
Placards/Marking (Bulk): Flammable solid / 1350
Packaging - Non-Bulk: P002, LP02
EMS: F-A, S-G
Note: ***Solid sulphur is not subject to the IMDG Code when formed to a specific shape such as prills, granules, pellets, pastilles or flakes. [IMDG 3.3.1 242]***

International Civil Aviation Org. / International Air Transport Assoc. (ICAO/IATA)

UN/ID #: UN1350
Proper Shipping Name: Sulphur
Hazard Class/Division: 4.1
Packing Group: III
Non-Bulk Package Marking: Sulphur, UN1350
Labels: Flammable solid
ERG Code: 3L
Note: ***Solid sulphur is not regulated when it has been formed to a specific shape, e.g. prills, granules, pellets, pastilles or flakes. [IATA DGR 4.4 A105]***

	LTD. QTY	Passenger Aircraft	Cargo Aircraft Only
Packaging Instruction #:	Y443	446	449
Max. Net Qty. Per Package:	10 kg	25 kg	100 kg

Section 15: Regulatory Information

CERCLA/SARA - Section 302 Extremely Hazardous Substances and TPQs (in pounds):
This material contains the following chemicals subject to the reporting requirements of SARA 302 and 40 CFR 372:

Component	TPQ	EPCRA RQ
Hydrogen Sulfide	500 lb	100 lb

CERCLA/SARA - Section 311/312 (Title III Hazard Categories)

Acute Health: Yes
Chronic Health: No
Fire Hazard: No
Pressure Hazard: No
Reactive Hazard: No

CERCLA/SARA - Section 313 and 40 CFR 372:
This material does not contain any chemicals subject to the reporting requirements of SARA 313 and 40 CFR 372.

EPA (CERCLA) Reportable Quantity (in pounds):
This material contains the following chemicals subject to the reporting requirements of 40 CFR 302.4:

Component	RQ
Hydrogen Sulfide	100 lb

California Proposition 65:
This material does not contain any chemicals which are known to the State of California to cause cancer, birth defects or other reproductive harm at concentrations that trigger the warning requirements of California Proposition 65.

International Hazard Classification

Canada:
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all the information required by the Regulations.

WHMIS Hazard Class:
B4 - Flammable Solids
D2B

National Chemical Inventories
All components are either listed on the US TSCA Inventory, or are not regulated under TSCA
All components are either on the DSL, or are exempt from DSL listing requirements

U.S. Export Control Classification Number: EAR99

Section 16: Other Information

Date of Issue:	03-Apr-2012
Status:	FINAL
Previous Issue Date:	03-Feb-2012
Revised Sections or Basis for Revision:	Format change Identified Hazards (Section 2) Toxicological (Section 11) Environmental hazards (Section 12)
SDS Number:	778933

Guide to Abbreviations:
ACGIH = American Conference of Governmental Industrial Hygienists; CASRN = Chemical Abstracts Service Registry Number; CEILING = Ceiling Limit (15 minutes); CERCLA = The Comprehensive Environmental Response, Compensation, and Liability Act; EPA = Environmental Protection Agency; GHS = Globally Harmonized System; IARC = International Agency for Research on Cancer; INSHT = National Institute for Health and Safety at Work; IOPC = International Oil Pollution Compensation; LEL = Lower Explosive Limit; NE = Not Established; NFPA = National Fire Protection Association; NTP = National Toxicology Program; OSHA = Occupational Safety and Health Administration; PEL = Permissible Exposure Limit (OSHA); SARA = Superfund Amendments and Reauthorization Act; STEL = Short Term Exposure Limit (15 minutes); TLV = Threshold Limit Value (ACGIH); TWA = Time Weighted Average (8 hours); UEL = Upper Explosive Limit; WHMIS = Worker Hazardous Materials Information System (Canada)

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