

Material Safety Data Sheet

Prilled Sulfur

1. Product and company identification

Product name	: Prilled Sulfur
Material uses	: Manufacturing sulfuric acid, sulfur dioxide, fertilizer, carbon disulfide, plastics, enamels; vulcanizing rubber; synthesizing dyes; bleaching wood pulp.
Headquarters	: Marsulex Inc. 111 Gordon Baker Road Suite 300 North York, ON M2H 3R1 (416) 496-9655 www.marsulex.com
MSDS authored by	: KMK Regulatory Services inc.
<u>In case of emergency</u>	: Canada: CANUTEC +1-613-996-6666 US: CHEMTREC +1-800-424-9300
Product type	: Solid.

2. Hazards identification

Color	: Yellow.
Physical state	: Solid.
Odor	: Rotten eggs. [Strong]
Hazard statements	: FLAMMABLE SOLID. MAY BE HARMFUL IF INHALED.
Precautions	: Keep away from heat, sparks and flame. Avoid breathing dusts. Keep container closed. Use only with adequate ventilation. WARNING: Material may contain hydrogen sulfide.
OSHA/HCS status	: This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).
Routes of entry	: Dermal contact. Eye contact. Inhalation. Ingestion.
<u>Potential acute health effects</u>	
Inhalation	: Vapors and dust are irritating to the nose, throat and respiratory tract.
Ingestion	: Ingestion may cause irritation.
Skin	: Slightly hazardous by the following route of exposure: of skin contact (irritant, sensitizer).
Eyes	: Slightly hazardous by the following route of exposure: of eye contact (irritant).
<u>Potential chronic health effects</u>	
Chronic effects	: No known significant effects or critical hazards.
Carcinogenicity	: No known significant effects or critical hazards.
Mutagenicity	: No known significant effects or critical hazards.
Teratogenicity	: No known significant effects or critical hazards.
Developmental effects	: No known significant effects or critical hazards.
Fertility effects	: No known significant effects or critical hazards.
<u>Over-exposure signs/symptoms</u>	
Inhalation	: Breathing of dust may aggravate acute or chronic asthma and chronic pulmonary disease such as emphysema and bronchitis.
Ingestion	: No specific data.
Skin	: No specific data.
Eyes	: No specific data.
Medical conditions aggravated by over-exposure	: Repeated exposure may cause chronic bronchitis.

2. Hazards identification

See toxicological information (section 11)

3. Composition/information on ingredients

United States

Name	CAS number	%
Sulfur	7704-34-9	>99
Hydrogen sulfide	7783-06-4	<1

Canada

Name	CAS number	%
Sulfur	7704-34-9	>99
Hydrogen sulfide	7783-06-4	<1

There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this section.

4. First aid measures

- Eye contact** : Immediately flush eyes with running water for a minimum of 15 minutes. Hold eyelids open during flushing. If irritation persists, repeat flushing. Obtain medical attention if irritation persists.
- Skin contact** : Flush skin with lukewarm running water for a minimum of 5 minutes or until the chemical is removed. Start flushing while removing contaminated clothing. If irritation persists, repeat flushing. Obtain medical attention if irritation remains.
- Inhalation** : Move victim to fresh air. Give artificial respiration ONLY if breathing has stopped. Give Cardiopulmonary Resuscitation (CPR) if there is no breathing AND no pulse. Obtain medical attention IMMEDIATELY.
- Ingestion** : DO NOT INDUCE VOMITING. If victim is alert and not convulsing, rinse mouth and give ½ to 1 glass of water to dilute material. If spontaneous vomiting occurs, have victim lean forward with head down to avoid breathing in of vomitus, rinse mouth and administer more water. IMMEDIATELY contact local poison control centre. Vomiting may need to be induced but should be directed by a physician or a poison control center. IMMEDIATELY transport victim to an emergency facility.
- Protection of first-aiders** : No action shall be taken involving any personal risk or without suitable training. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation.
- Notes to physician** : No specific treatment. Contact poison treatment specialist immediately if large quantities have been ingested or inhaled.

5. Fire-fighting measures

Flammability of the product : Flammable solid.

Extinguishing media

- Suitable** : SMALL FIRE: Use dry chemical powder.
LARGE FIRE: Use water spray or fog. Cool sulfur containing vessels with water jet in order to prevent pressure build-up, autoignition or explosion. If tank, rail car or tank truck is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions.
- Not suitable** : Do not use water jet.
- Hazardous thermal decomposition products** : Decomposition products may include the following materials:
sulfur oxides
- Special protective equipment for fire-fighters** : Wear self-contained breathing apparatus and full protective clothing. Avoid straight streams of water, which can scatter dust. Small fires can be extinguished with sand. Fire will rekindle until mass is cooled below 154°C (310°F).
- Special remarks on fire hazards** : Oxidizing material.
- Special remarks on explosion hazards** : Easily ignitable, combustible solid. Dust suspended in air ignites easily and can cause an explosion. Hazardous in contact with oxidizing materials, forming explosive mixtures. Sulfur burns with a pale blue flame that may be difficult to see in daylight.

6. Accidental release measures

- Personal precautions** : Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilled material. Shut off all ignition sources. No flares, smoking or flames in hazard area. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment (see section 8).
- Environmental precautions** : Avoid dispersal of spilled material and 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).
- Small spill** : With clean shovel place material into clean, dry container and cover loosely. Move containers from spill area.
- Large spill** : Stop discharge and contain if safe to do so. ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area). Do not touch or walk through spilled material. Do not allow material to enter water sources or sewers. Shovel solid sulfur into containers with covers (avoid dusting) for recovery or disposal. If removal is not immediate, apply a cover material, preferably inert and basic (limestone), to the spilled area until recovery procedures begin. This will reduce the possible release of sulfuric acid in the water. Collect product and contaminated soil and water for recovery or disposal. Consider initial downwind evacuation for at least 100 meters (330 feet).

7. Handling and storage

- Handling** : Keep away from heat, sparks and flame. To avoid fire, eliminate ignition sources.
- Storage** : Keep container in a cool, well-ventilated area. Keep container tightly closed and sealed until ready for use. Avoid all possible sources of ignition (spark or flame).

8. Exposure controls/personal protection

United States

Ingredient	Exposure limits
Sulfur	<p>ACGIH TLV (United States). TWA: 10 mg/m³ 8 hour(s). Form: Nuisance dust.</p> <p>OSHA PEL (United States). TWA: 15 mg/m³ 8 hour(s). Form: Nuisance dust.</p>
Hydrogen sulfide	<p>ACGIH TLV (United States, 1/2009). STEL: 21 mg/m³ 15 minute(s). STEL: 15 ppm 15 minute(s). TWA: 14 mg/m³ 8 hour(s). TWA: 10 ppm 8 hour(s).</p> <p>NIOSH REL (United States, 6/2008). CEIL: 15 mg/m³ 10 minute(s). CEIL: 10 ppm 10 minute(s).</p> <p>OSHA PEL Z2 (United States, 11/2006). AMP: 50 ppm 10 minute(s). CEIL: 20 ppm</p>

Canada

Occupational exposure limits		TWA (8 hours)			STEL (15 mins)			Ceiling			
Ingredient	List name	ppm	mg/m ³	Other	ppm	mg/m ³	Other	ppm	mg/m ³	Other	Notations
Sulfur	US ACGIH	-	10	-	-	-	-	-	-	-	[a]
	AB 6/2008	-	10	-	-	-	-	-	-	-	
Hydrogen sulfide	US ACGIH 1/2009	10	14	-	15	21	-	-	-	-	
	AB 6/2008	10	14	-	-	-	-	15	21	-	
	BC 6/2008	-	-	-	10	-	-	-	-	-	
	ON 6/2008	10	14	-	15	21	-	-	-	-	
	QC 6/2008	10	14	-	15	21	-	-	-	-	

Form: [a]Nuisance dust.

Consult local authorities for acceptable exposure limits.

- Recommended monitoring procedures** : Personal, workplace atmosphere or biological monitoring may be required to determine the effectiveness of the ventilation or other control measures and/or the necessity to use respiratory protective equipment.

8. Exposure controls/personal protection

- Engineering measures** : 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. The engineering controls also need to keep gas, vapor or dust concentrations below any lower explosive limits. Use explosion-proof ventilation equipment.
- Hygiene measures** : Ensure that eyewash stations and safety showers are close to the workstation location. 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.
- Respiratory** : NIOSH/MSHA approved dust mask, for dust concentrations of up to 50 mg/m³. Airpurifying half-mask or full-face piece respirator equipped with dust cartridges for concentrations up to 100 mg/m³. An air-supplied respirator if concentrations are higher or unknown.
If Hydrogen sulfide is present at a higher level than the acceptable exposure limit, please refer to the Hydrogen sulfide MSDS for appropriate information and suggested protective clothing. A gas mask with canister to protect against hydrogen sulfide; or escape-type SCBA may become necessary.
- Hands** : Use gloves appropriate for work or task being performed. Recommended: Neoprene, PVC, vinyl or rubber.
- Eyes** : Safety eyewear should be used when there is a likelihood of exposure. Recommended: Safety glasses.
- Skin** : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product. Recommended: Lab coat or coveralls.
- Environmental exposure controls** : Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

9 . Physical and chemical properties

- Physical state** : Solid.
- Flash point** : Closed cup: 206.85°C (404.3°F) [Pensky-Martens.]
- Auto-ignition temperature** : 231.85°C (449.3°F)
- Flammable limits** : LOWER: 35 g/m³
UPPER: 1400 g/m³
- Color** : Yellow.
- Odor** : Rotten eggs. [Strong]
- Molecular weight** : 32.06 g/mole
- Molecular formula** : S
- Boiling/condensation point** : 444.6°C (832.3°F)
- Melting/freezing point** : 119°C (246.2°F)
- Specific gravity** : 1.8 g/cm³
- Vapor pressure** : 0.015 kPa (0.11 mm Hg)
- Solubility** : Insoluble in the following materials: cold water and hot water. Soluble in carbon disulfide, benzene, toluene, chloroform, ether, warm aniline, carbon tetrachloride and liquid ammonia.

10. Stability and reactivity

- Chemical stability** : The product is stable.
- Conditions to avoid** : Avoid all possible sources of ignition (spark or flame).
- Materials to avoid** : Alkalis and oxidizing agents such as chlorine and fluorine. May react explosively with ammonia, ammonium nitrate, chlorine dioxide (bromates, chlorates, and iodates of barium, calcium, magnesium, potassium, sodium or zinc), chlorate in presence of copper), chromic anhydride, silver bromate, lead dioxide, mercuric nitrate, all inorganic perchlorates, phosphorus trioxide, sodium nitrate, and zinc.
- Hazardous decomposition products** : Produces oxides of sulfur on combustion.
- Possibility of hazardous reactions** : Under normal conditions of storage and use, hazardous reactions will not occur.
- Hazardous polymerization** : Under normal conditions of storage and use, hazardous polymerization will not occur.

11. Toxicological information

Acute toxicity

Product/ingredient name	Result	Species	Dose	Exposure
Sulfur	LD50 Oral	Rat	>8437 mg/kg	-
Hydrogen sulfide	LC50 Inhalation Vapor	Rat	700 mg/m3	4 hours

- Chronic toxicity** : No specific data.

12. Ecological information

- Environmental effects** : Not established

Aquatic ecotoxicity

Product/ingredient name	Result	Species	Exposure
Sulfur	Acute EC50 >5000 ppm Fresh water	Daphnia - Daphnia magna - <24 hours	48 hours
	Acute LC50 <14 ppm Fresh water	Fish - Lepomis macrochirus	96 hours
Hydrogen sulfide	Acute EC50 540 ug/L Fresh water	Crustaceans - Crangonyx richmondensis lauren - 10 mm	48 hours
	Acute LC50 <2 ug/L Fresh water	Fish - Perca flavescens - Yolk-sac fry	96 hours

- Products of degradation** : Products of degradation: sulfur oxides (SO₂, SO₃ etc.).







13. Disposal considerations

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

Disposal should be in accordance with applicable regional, national and local laws and regulations.

Refer to Section 7: HANDLING AND STORAGE and Section 8: EXPOSURE CONTROLS/PERSONAL PROTECTION for additional handling information and protection of employees.

14 . Transport information

Regulatory information	UN number	Proper shipping name	Classes	PG*	Label	Additional information
DOT Classification	UN1350	SULFUR	4.1	III		Special provisions 30, IB8, IP2
TDG Classification	UN1350	SULFUR	4.1	III		Special provisions 33
IMDG Class	UN1350	SULFUR. Marine pollutant (Hydrogen sulfide)	4.1	III	 	-
IATA-DGR Class	UN1350	SULFUR	4.1	III	 	Passenger and Cargo Aircraft Quantity limitation: 20 kg Cargo Aircraft Only Quantity limitation: 100 kg Limited Quantities - Passenger Aircraft Quantity limitation: 10 kg

PG* : Packing group

Exemption to the above classification may apply.

AERG : 133

15 . Regulatory information

United States

HCS Classification

: Flammable solid
Irritating material

U.S. Federal regulations

: **United States inventory (TSCA 8b)**: This material is listed or exempted.

SARA 302/304/311/312 extremely hazardous substances: No products were found.

SARA 302/304 emergency planning and notification: No products were found.

SARA 302/304/311/312 hazardous chemicals: Sulfur

SARA 311/312 MSDS distribution - chemical inventory - hazard identification:
Sulfur: Fire hazard

Clean Water Act (CWA) 307: No products were found.

Clean Water Act (CWA) 311: No products were found.

Clean Air Act (CAA) 112 accidental release prevention: No products were found.

Clean Air Act (CAA) 112 regulated flammable substances: No products were found.

Clean Air Act (CAA) 112 regulated toxic substances: No products were found.

Clean Air Act Section 112(b) Hazardous Air Pollutants (HAPs)

: Not listed

Clean Air Act Section 602 Class I Substances

: Not listed

Clean Air Act Section 602 Class II Substances

: Not listed

15 . Regulatory information

DEA List I Chemicals (Precursor Chemicals)

: Not listed

DEA List II Chemicals (Essential Chemicals)

: Not listed

State regulations

Connecticut Carcinogen Reporting: This material is not listed.
Connecticut Hazardous Material Survey: This material is not listed.
Florida substances: This material is not listed.
Illinois Chemical Safety Act: This material is not listed.
Illinois Toxic Substances Disclosure to Employee Act: This material is not listed.
Louisiana Reporting: This material is not listed.
Louisiana Spill: This material is not listed.
Massachusetts Spill: This material is not listed.
Massachusetts Substances: This material is listed.
Michigan Critical Material: This material is not listed.
Minnesota Hazardous Substances: This material is not listed.
New Jersey Hazardous Substances: This material is listed.
New Jersey Spill: This material is not listed.
New Jersey Toxic Catastrophe Prevention Act: This material is not listed.
New York Acutely Hazardous Substances: This material is not listed.
New York Toxic Chemical Release Reporting: This material is not listed.
Pennsylvania RTK Hazardous Substances: This material is listed.
Rhode Island Hazardous Substances: This material is not listed.

California Prop. 65

No products were found.

Canada

WHMIS (Canada)

: Class B-4: Flammable solid.
 Class D-2B: Material causing other toxic effects (Toxic).

Canadian lists

: **CEPA Toxic substances:** This material is not listed.
Canadian ARET: This material is not listed.
Canadian NPRI: This material is not listed.
Alberta Designated Substances: This material is not listed.
Ontario Designated Substances: This material is not listed.
Quebec Designated Substances: This material is not listed.

Canada inventory

: This material is listed or exempted.

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

International regulations

International lists

: **Australia inventory (AICS):** This material is listed or exempted.
China inventory (IECSC): This material is listed or exempted.
Japan inventory: Not determined.
Korea inventory: This material is listed or exempted.
New Zealand Inventory of Chemicals (NZIoC): This material is listed or exempted.
Philippines inventory (PICCS): This material is listed or exempted.

Chemical Weapons Convention List Schedule I Chemicals

: Not listed

Chemical Weapons Convention List Schedule II Chemicals

: Not listed

Chemical Weapons Convention List Schedule III Chemicals

: Not listed

16 . Other information

United States

Label requirements : FLAMMABLE SOLID. MAY BE HARMFUL IF INHALED.

Hazardous Material Information System (U.S.A.) :

Health	2
Flammability	1
Physical hazards	0

Caution: HMIS® ratings are based on a 0-4 rating scale, with 0 representing minimal hazards or risks, and 4 representing significant hazards or risks. Although HMIS® ratings are not required on MSDSs under 29 CFR 1910.1200, the preparer may choose to provide them. HMIS® ratings are to be used with a fully implemented HMIS® program. HMIS® is a registered mark of the National Paint & Coatings Association (NPCA). HMIS® materials may be purchased exclusively from J. J. Keller (800) 327-6868.

The customer is responsible for determining the PPE code for this material.

National Fire Protection Association (U.S.A.) :



Canada

WHMIS (Canada) :



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Notice to reader

To the best of our knowledge, the information contained herein is accurate. However, neither the above-named supplier, nor any of its subsidiaries, assumes any liability whatsoever for the accuracy or completeness of the information contained herein.

Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.