



## Sulphur, Molten

### Material Safety Data Sheet

#### 1. Product and Company Identification

Product Name: Sulphur, Molten  
Synonym: Sulfur, Molten Sulphur  
Product use: A raw material used in the manufacture of sulphuric acid and other chemical manufacturing.  
Manufacturer: ARC Resources Ltd.  
Address: Suite 2100, 440 2<sup>nd</sup> Street SW  
Calgary, AB, T2P 5E9  
Emergency Contact: 403-292-0434  
Canutec: (613) 996-6666 or Cellular \*666

#### 2. Hazards Identification

##### EMERGENCY OVERVIEW

Elemental sulphur may contain trace amounts of hydrogen sulphide. Hydrogen sulphide and sulphur dioxide may be generated upon melting of sulphur. Hydrogen sulphide may cause respiratory failure and possible death at or above 300 ppm.

##### POTENTIAL HEALTH EFFECTS/ROUTES OF EXPOSURE

**Eye:** Contact with molten liquid will cause severe burns to eyes.

**Skin:** Contact with molten liquid will cause severe burns to skin.

**Ingestion:** Molten sulphur will cause severe burns to skin and other tissues.

**Inhalation:** Molten sulphur will emit Hydrogen Sulphide (H<sub>2</sub>S) and Sulphur dioxide (SO<sub>2</sub>) which may cause irritation to eyes, nose, throat and lungs. It may also lead to headaches, drowsiness, unconsciousness and even death. Residual effects may include shortness of breath and wheezing. Long-term effects may include respiratory problems.

#### 3. Composition/Information on Ingredients

Ingredient Name	%	CAS No.
Sulphur molten	99.9	7704-34-9
Hydrogen sulphide	trace	7783-06-4
Sulphur dioxide	trace	7446-09-5

#### 4. First Aid Measures

**Eyes:** Rinse with water for at least 20 minutes. Get medical attention immediately.



## Sulphur, Molten

<b>Skin:</b>	Do not try to remove contaminated clothing or encrusted sulphur. Cover skin with clean, dry dressings and do not apply burn ointments! Seek medical attention immediately.
<b>Ingestion:</b>	DO NOT attempt to give anything by mouth to an unconscious person. Get medical attention immediately.
<b>Inhalation:</b>	Ensure your own safety and use the appropriate respiratory protection to immediately remove the victim to an area free of contaminants. Give CPR or artificial respiration as needed and give oxygen if breathing is difficult. Keep victim at rest and get immediate medical attention.

---

## 5. Fire Fighting Measures

### FLAMMABLE PROPERTIES

Molten Liquid than can emit Flammable Vapours

### HAZARDOUS COMBUSTION PRODUCTS

Fire may generate hydrogen sulphide and evacuation of the area should be considered. Irritating and toxic gases may be formed during combustion including hydrogen sulphide, sulphur dioxide, carbon monoxide and carbon dioxide. Hydrogen sulphide may build up in enclosed spaces.

### FIRE AND EXPLOSION HAZARDS

Sulphur is a flammable/combustible material and may be ignited by friction, heat, sparks or flames. Molten sulphur is readily ignitable and combustible. Sulphur may burn rapidly with a flare effect. May re-ignite after fire has been extinguished.

### EXTINGUISHING MEDIA

**Small Fires:** Dry chemical, CO<sub>2</sub>, sand, earth, water spray or regular foam.

**Large Fires:** Water spray, fog or regular foam. Move containers from fire area if possible without risk. 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.

### FIRE FIGHTING INSTRUCTIONS:

Isolate the fuel source and use water to keep fire exposed containers cool. Firefighters should wear complete turnout gear, including a positive pressure self-contained breathing apparatus (SCBA). Rescue personnel with the same equipment should be standing by. Fires may generate hydrogen sulphide and evacuation of the area should be considered. Fight fire from the maximum distance and approach fire from upwind to avoid hazardous decomposition products. Prevent water run-off from entering sewers or drinking water.

### UNUSUAL FIRE & EXPLOSION HAZARDS:

Vapors given off during melting of sulphur may contain sufficient hydrogen sulphide & carbon disulphide to permit ignition of air/vapor mixture on contact with a hot surface. Such ignition may result in transmission of flames to molten sulphur.



---

## **6. Accidental Release Measures**

### **ACTIVATE SITE SPECIFIC EMERGENCY RESPONSE PLAN, IF AVAILABLE.**

**Small Spills:** Isolate area immediately for at least 10 to 25 meters (30 to 80 feet) in all directions and ensure ventilation of the area to below LEL and OEL before entering. Eliminate all sources of ignition and/or flow. Keep unauthorized personnel away and do not touch or walk through spilled material. Stay upwind. Keep out of low areas. With clean shovel place material into clean, dry container and cover loosely; move containers from spill area.

**Large Spills:** Isolate area immediately and consider initial downwind evacuation for at least 100 meters (330 feet). Eliminate all sources of ignition and/or flow. Keep unauthorized personnel away and do not touch or walk through spilled material. Stay upwind. Keep out of low areas. Dike if liquid spill and wet down with water for later disposal. Prevent entry into waterways, sewers, basements or confined areas.

**Evacuation:** Fire: 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.

**Caution:** Ensure your own safety and use the appropriate respiratory protection. An approved self-contained breathing apparatus (SCBA) with full-face piece may be required. Consideration should be given to environmental clean-up and waste material generation when deciding if the use of large volumes of water is appropriate for non-fire emergency situations. Clean-up crews must be properly trained and must utilize proper protective equipment.

---

## **7. Handling and Storage**

### **HANDLING PRECAUTIONS**

Hydrogen sulphide and sulphur dioxide concentrations may reach hazardous levels if working with molten sulphur at or above its melting point of 112° C. Use in a well-ventilated area, away from all sources of ignition including smoking, welding, etc. The area must be kept clear of flammable materials and oxidizers. Ground and bond all lines and equipment. Use an approved ventilation system and other electrical equipment in classified/controlled areas.

### **STORAGE PRECAUTIONS**

Outside storage is recommended. Store in a cool, dry, well-ventilated location and away from oxidizers such as oxygen, chlorine, bromine and peroxides.

### **WORK/HYGIENIC PRACTICES**

An emergency eye wash station should be available in the vicinity of any potential splash exposure. Use good personal hygiene practices. Avoid exposure to skin. Do not eat, drink or smoke in areas of use or storage and wash hands prior to eating, drinking, smoking, or using toilet facilities. Promptly remove contaminated clothing and launder before reuse. Use care when laundering to prevent the formation of flammable vapors which could ignite via washer or dryer. Consider the need to discard contaminated leather shoes and gloves.

## 8. Exposure Controls / Personal Protection



### ENGINEERING CONTROLS

Ventilate area (mechanical general and/or local exhaust ventilation) where product is used, stored and/or handled to maintain airborne concentrations below the LEL and OEL. Ventilation system should be approved and should be vented directly to the outdoors. It should also be grounded and separate from other exhaust ventilation systems. Adequate make-up air must be provided.



### PERSONAL PROTECTIVE EQUIPMENT

**Eye/Face Protection:** Wear chemical goggles and a face shield unless full-face respiratory protection is being worn.

**Skin Protection:** Wear fire retardant clothing and insulated protective gloves when handling molten sulphur

**Respiratory Protection:** An air supplied respirator 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. Refer to CSA Standard "Selection, Use and Care of Respirators" (Z94.4-02) and NIOSH Respirator Decision Logic for additional guidance on respiratory protection.

### Exposure Limits

Ingredient Name	CAS No.	Exposure Limits
Sulphur molten	7704-34-9	ACGIH Particles Not Otherwise Classified: 3mg/m <sup>3</sup> (respirable) 10mg/m <sup>3</sup> total
Hydrogen sulphide	7783-06-4	ACGIH TLV TWA = 1 ppm ACGIH TLV STEL = 5 ppm Alberta OEL 10 ppm 8 hour TWA, 15 ppm Ceiling BC EL 10 ppm Ceiling Saskatchewan 10 ppm 8 hour TWA, 15 ppm Ceiling
Sulphur dioxide	7446-09-5	ACGIH TLV STEL = 0.25ppm



### 9. Physical and Chemical Properties

Appearance and state:	Yellow hot liquid
Odour:	Rotten egg like odour when residual hydrogen sulphide is present.
Odour Threshold:	Not available
Flash Point:	207°C (405°F)
Auto Ignition:	232°C (450°F).
Lower Explosive Limit (%):	35g/m <sup>3</sup>
Upper Explosive Limit (%):	1400g/m <sup>3</sup>
Boiling Point:	444.6°C
Melting Point:	112.8 – 120° C
Vapour Pressure:	3.95X10 <sup>-6</sup> mm Hg at 30.4 deg C
Vapour Density (Air = 1):	0.00005 lb/cu ft at 90 deg F
Viscosity:	11.130 CP at 251 deg F
Specific Gravity:	2.07 kg/l (liquid, 20 deg C)
Solubility (H <sub>2</sub> O):	Insoluble in water
Percent Volatiles:	Zero
Evaporation Rate:	Not Available

### 10. Stability and Reactivity

#### STABILITY

Stable

#### CONDITIONS TO AVOID (STABILITY)

Avoid high temperatures, open flames, sparks, welding, smoking and other ignitions sources.

#### INCOMPATIBLE MATERIALS

Strong oxidizing agents such as peroxides, chlorine, nitrates and perchlorates, as well as halogens, mineral acids and alkalies.

#### HAZARDOUS DECOMPOSITION PRODUCTS

Irritating or toxic substances may be emitted upon thermal decomposition including carbon monoxide, carbon dioxide, sulphur dioxide and hydrogen sulphide.

#### HAZARDOUS POLYMERIZATION

Will Not Occur.

### 11. Toxicological Information

Ingredient Name	CAS No.	LD50	LC50
Sulphur	7704-34-9	Not available	Not applicable
Hydrogen sulphide	7783-06-4	Not applicable	Mouse inhalation 380 mg/cu m/410 min
Sulphur dioxide	7446-09-5	Not applicable	Mouse inhalation 1000 ppm/4 hr

#### POTENTIAL HEALTH EFFECTS



## Sulphur, Molten

**Acute effects:** Potential acute effects are tracheobronchitis characterized by cough, sore throat, chest pain, and lightheadedness. May cause irritation of skin and mucous membranes. An individual may be exposed to sulphur dust for several hours or days before beginning to develop discomfort in the eyes. This may then progress to burning and tearing, with blurring of vision.

**Chronic effects:** Potential chronic effects from exposure may include ulceration of the skin, conjunctivitis, inflammation of the nasal mucosa, shortness-of-breath, asthma, and tracheobronchitis.

**Sensitization:** Not applicable.

**Mutagenicity:** Not applicable.

**Reproductive effects:** Not applicable.

**Carcinogenicity:** Not listed by IARC, NTP or ACGIH.

**Target organs:** Central nervous system (CNS), heart, blood forming systems, liver and kidneys as well as the gastrointestinal tract and respiratory system.

---

### 12. Ecological Information

If released to the environment will cool to form solid sulphur. Solid sulphur is insoluble.

---

### 13. Disposal Considerations

Preferred waste management priorities are recycling or reprocess.

---

### 14. Transport Information

<b>PROPER SHIPPING NAME:</b>	<b>Sulphur, Molten</b>
<b>PRIMARY TDG CLASS:</b>	<b>4.1</b>
<b>SECONDARY TDG CLASS:</b>	<b>Not Applicable</b>
<b>TDG IDENTIFICATION NUMBER:</b>	<b>UN2448</b>
<b>Packing Group:</b>	<b>III</b>
<b>EMERGENCY RESPONSE GUIDE:</b>	<b>133</b>

---

### 15. Regulatory Information

#### WORKPLACE HAZARDOUS MATERIALS INFORMATION SYSTEM (WHMIS)

Workplace Hazardous Materials Information Systems (WHMIS): This product has been classified in accordance with the hazard criteria of the CPR (Controlled Product Regulations), and the MSDS contains all of the information required by the CPR.



**Class B4 - Flammable Solid**

**Class D2B - Toxic by other means**

CANADIAN ENVIRONMENTAL PROTECTION ACT (CEPA)

All components of this product are listed on the Canadian DSL Inventory.



## **Sulphur, Molten**

### **Risk Phrases: 36/37/38**

Irritating to eyes, respiratory system and skin.

### **Safety Phrases: 16-20/21-33-36/37/39-45**

Keep away from sources of ignition - No smoking. When using do not eat, drink or smoke. Wear suitable protective clothing, gloves and eye/face protection. In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible). Take precautionary measures against static discharges.

---

## **16. Other Information**

Prepared for:	ARC Resources Safety Department
Preparation information:	403.503.8600
Prepared by:	Deerfoot Consulting Inc.

### **Disclaimer of Expressed and Implied Warranties**

The information presented in the Material Safety Data Sheet is based on data believed to be accurate as of the date this Material Safety Data Sheet was prepared. However, neither Arc Resources, Deerfoot Consulting Inc nor any of their subsidiaries assumes any liability whatsoever for the accuracy or completeness of the information contained herein. No responsibility is assumed for any damage or injury resulting from abnormal use or from any failure to adhere to recommended practices. The information provided above, and the product, are furnished on the condition that the person receiving them shall make their own determination as to the suitability of the product for their particular purpose and on the condition that they assume the risk of their use.