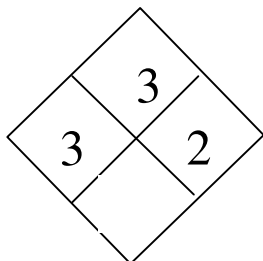


**RISK DIAMMOND****Fire:**

3-Flammability hazard.

**Health:**

3-Very hazardous.

**Reactivity:**

2-Violent chemical reaction

**1. PRODUCT AND COMPANY IDENTIFICATION**

- Product name (label): Sulfur or Liquid Sulfur.
- Name in English: Sulfur or Sulphur.
- Supplier name, address and telephone number:  
Elekeiroz S.A. (Unit Várzea Paulista-SP) - Rua Dr. Edgardo de Azevedo Soares, 392  
CEP 13224-030  
Telephone: **(0xx11) 4596-8800 (24 h)**. Fax: (0xx11) 4596-8881  
Elekeiroz S.A. (Unit Camaçari-BA) - Rua João Úrsulo, 1261, Pólo Petroquímico do Nordeste  
CEP 42810-000  
Phone: **(0xx71) 3632-7711 (24 h)**  
Fax: (0xx71) 3632-2110  
E-mail (customer service):  
[elisabete.moskalenko@elekeiroz.com.br](mailto:elisabete.moskalenko@elekeiroz.com.br)  
[carlos.villani@elekeiroz.com.br](mailto:carlos.villani@elekeiroz.com.br)
- Elekeiroz supplier name, address and telephone number:
  - 1) SHELL CANADA LTD. (Canada)  
Representative: ICEC do Brasil Ltda.  
R. Jesuíno Arruda, 676 conj. 45 – SP – CEP 04532-082
  - 2) PRISM SULPHUR CORPORATION (Canadá)  
Representative: Fertimport S.A.  
Av. Maria Coelho de Aguiar, 215 – bl. D – 6º Andar – SP – CEP 05804-000
  - 3) AMOCO CANADA PETROLEUM COMPANY LTD.  
Representative: GILBRAS Ind. E Comércio Ltda.  
Av. Nilo Peçanha, 50 gr. 2016 – RJ – CEP 20044-900

**2. COMPOSITION AND INFORMATION ABOUT INGREDIENTS**

- Common chemical name of the substance:  
**Sulfur (solid/liquid)**
- Synonyms:  
Brimstone; S, Sulfur, Sulphur.
- Register in *Chemical Abstract Service* (CAS Nº): [7704-34-9]

### 3. HAZARDS IDENTIFICATION

- Hazards and most important effects:  
Sulfur is not listed as carcinogenic.  
Highest risk is due to the formation of SO<sub>2</sub> as combustion product, which is highly toxic, highly irritant to mucous membranes of respiratory ways.  
Molten sulfur, due to hydrocarbons impurities, releases sulfidric acid which is highly toxic, even at low concentrations.  
Powder sulfur can irritate mucous membranes of respiratory tract and the inner part of eyelids. For some individuals, cutaneous sensitization can occur due to repeated contact with sulfur.
- Specific Hazards:  
Solid Flammable (Class 4.1).

### 4. FIRST AID MEASURES

- Inhalation:  
H<sub>2</sub>S – Hydrogen Sulfide / Sulfidric Gas (only generated at temperatures above 120°C). Immediately put a selfcontained breathing apparatus over the victim and remove him/her from the risk area.  
If the victim is unconscious or breathing with difficulty, start artificial respiration, immediately/sem perda de tempo. Notify Safety and Medical Departments immediately.  
In case of poisoning, call a physician and keep the victim resting and under strict observation during approximately 48 hours.
- Contact with skin:  
Remove contaminated clothing and shoes. Wash the affected area with plenty of water and soap. In case of burns, cool immediately the affected area with cold water. **DO NOT REMOVE SULFUR.**  
Look for medical help.
- Contact with eyes:  
Wash immediately with plenty of water during 15 minutes, including under eyelids.
- Ingestion:  
Never give anything through the mouth in case the victim is unconscious or convulsioneing. If the victim is conscious, induce to vomit. This will have a better effect after 30 minutes of ingestion.  
Look for medical help.
- Additional information:  
In all cases, medical service should be actuated for complete treatment, observation and support after first aid measures. Remove any worker who presents allergic reactions to sulfur resulting from a prolonged contact. Consult an expert before any worker be allowed returning to work in areas where the exposure to sulfur is similar.  
Contact lenses constitute an especial hazard. Gelatinosous lenses can absorb irritant materials and all lenses concentrate irritant materials. Particles can adhere to contact lenses and cause damages to cornea. Do not wear contact lenses in any area.
- Notes to physician:

In case of contact with eyes – ocular washing with plenty of serum glico-physiologic until all sulfur is removed. After that, apply anesthetic collyrium.

Sulfur dioxide: oxygentherapy, bronchiodilators, decongestant, sedatives for cough, corticoestheroids.

H<sub>2</sub>S: induce metahemoglobine with amila nitrite and sodium nitrate or EDTA (kelocyanor), if it is available. Amila nitrite inhalation (0.2 ml – 1 capsule), during 30 seconds per minute. Keep breathing with oxygen at 100%. Interrupt amila nitrite inhalation until it's possible to administer a sodium nitrate solution at 3%, 10 ml. EV, 2.5 to 5 ml/minute (children 10 mg/kg). Respiratory and cardiorespiratory assistance. Even in case of cardiac arrest it should be tried therapeuthics (injection: intracardiac of sodium nitrate).

**IMPORTANT:** physicians and paramedics who manipulate the victim should take care to avoid inhalation close to him/her. Intoxication risk by H<sub>2</sub>S. It's recommended proper local ventilation and/or exhaustion.

## 5. FIREFIGHTING MEASURES

- Fire and explosion hazards  
Presents fire and explosions hazards. In the form of dust it can explode easily, including with static electricity or attriction, like ignition sources. It can ignite due to the generated heat, by attriction.
- Proper extinguishing media:  
Water fog or mist, CO<sub>2</sub>, dry powder. Little fire focus of solid sulfur can be contained with sand, fine earth or pure sulfur as extinguishing agent.
- Especial firefighting procedures:  
The highest risk is due to SO<sub>2</sub> formation as combustion product, which is highly toxic. Wear respiratory protection and for the eyes, during firefighting.  
It should be avoided its contact with oxidizing agents with which it reacts chemically.

## 6. MEASURES FOR SPILLS OR LEAKAGES

- Personal precautions:
  - Notify Environment and Occupational Safety Departments.
  - Evacuate non essential personnel, and provide adequate ventilation.
  - Shut off/cut ignition sources, avoid sparks, open flames or smoking in hazard area.
  - Avoid dust formation.
- Cleaning methods:  
Collect spilled material in adequate containers for disposal.  
Little dry spills, collect with clean shovel or vacuum/aspirar carefully without generating dust clouds, put in clean and dry containers and cover/tampar. Remove containers from the spill area to clean it posteriormente. Water applied in form of mist it can help to cool and solidify spills of molten sulfur. Unless it is contaminated, solid sulfur can be molten again and reused.
- Environmental precautions:
  - Contact supplier or specialized company in wastes removal and disposal, for detailed recommendations. Follow federal, state and municipal regulations.

## 7. HANDLING AND STORAGE

- **Handling:**  
Avoid contact with sulfur, wearing the indicated protection equipment Do not eat, drink or smoke in product handling areas.
- **Storage:**
  - Storage of solid sulfur can be done outdoors, when in closed compartment it's necessary to avoid dust accumulation and formation of suspended dusts, because the dust can form explosive mixture with air.
  - Any ignition source should be kept away from the area.
  - Storage with incompatible materials, see item 10.

Molten sulfur storage tanks vents should be periodically checked to avoid plugging.

- **Safe materials for packages:**  
The material should be stored outdoors and ventilated.

## 8. EXPOSURE CONTROLS AND PERSONAL PROTECTION

- **Control parameters:**
  - Solid sulfur: there is nothing specific for sulfur, it is treated as incômoda particle and its threshold limit/value is  $10 \text{ mg/m}^3$  (ACGIH)
  - Sulfur dioxide ( $\text{SO}_2$ ): NR 15, Decree 3.214/78: 4 ppm or  $10 \text{ mg/m}^3$ .
  - Sulfidric gas / hydrogen sulfide ( $\text{H}_2\text{S}$ ): NR 15, Decree 3.214/78: 8 ppm or  $12 \text{ mg/m}^3$ .
- **Proper personal protective equipment:**
  - Solid sulfur: hard hat, safety glasses, pvc glasses and safety shoes.
  - Liquid sulfur: hard hat, facial protection, rasp gloves, rasp jacket and trousers and safety shoes.
  - In case of emergency, or situations out of routine (tanks cleaning, etc.) it should be used selfcontained breathing apparatus, or supplied air equipment.  
The operator should be aware of  $\text{H}_2\text{S}$  odour. In case odour is detected, it should put the mask immediately, warn/avisar the involved in the area, as well avisar Industrial Safety.  
If the operator feels the odour and, em seguida, stops feeling, he should not assume the danger is over and, sim, proceed as above and ask for  $\text{H}_2\text{S}$  presence tests.
- **Collective Protective Equipment:**  
In case of emergency, or situations out of routine (tanks cleaning, etc.) keep forced ventilation, in such a way to reduce contaminants concentration and to keep oxygen level.  
Keep showers and eyes washing facilities in the area.

## 9. PHYSICAL-CHEMICAL PROPERTIES

- **Physical state:** solid under normal conditions.  
Liquid, when heated between  $120^\circ\text{C}$  and  $140^\circ\text{C}$ .
- **Color:** yellow when solid; liquid, exist under several yellow tonalities.
- **Odour:** characteristic of the product.
- **pH:** not available
- **Specific temperatures or temperature ranges at which occur physical state changes:**

- Boiling point: 112°C.
- Melting point: 444.6°C.
- Flash point: 207.2°C (T.C.C.)
- Ignition point: 232.2°C
- Explosion limits: Not specified for liquid sulfur.
- Vapour pressure: Not available.
- Vapour density: not available.
- Density: Solid – 2.06 (20°C)  
Liquid – 1.8 (125°C)
- Solubility: insoluble in water.  
Soluble (20°C) – g/100g of solvent; in carbon sulfide (25.0), benzene (1.7), toluene (1.7), carbon tetrachloride (0.6); slightly soluble in glycol and ether.  
Obs.: these values are typical results and, portanto, does not apresentam any implicit or explicit warranty about the product.

## 10. STABILITY AND REACTIVITY

- Specific conditions:  
Sulfur is considered stable under normal handling and storage conditions. It does not polymerize.
- Hazardous reactions:  
Addition of water to solid sulfur can cause steel corrosion. Molten sulfur reacts with hydrocarbons producing H<sub>2</sub>S.  
- Oxidizers (explosive mixture); iodides, bromides, chlorides, perchlorides, nitrates, di-ethyl ether, hydrocarbons, sodium, calcium, and zinc (possible explosion), aluminum (violent reaction); boron, carbon and fluorine (possible ignition).
- Hazardous decomposition products:  
Burning of sulfur produces SO<sub>2</sub>.

## 11. TOXICOLOGICAL INFORMATIONS

- Acute toxicity and local effects (styrene monomer):
  - At high concentrations, sulfur dust affects respiratory system.
  - Dosis and Lethal concentration:  
H<sub>2</sub>S:  
LC<sub>L0</sub> – 600 ppm (30 mins.) – human (inhalation).  
  
SO<sub>2</sub>:  
LC<sub>L0</sub> – 400 ppm/1 min. – human (inhalation).

## 12. ECOLOGICAL INFORMATION

- Environmental effects, behaviors and product impacts
  - The spilled sulfur over the soil when in contact with moisture (rain, etc.) turns it acid.

-In contact with bodies of water in wellsprings it changes water acidity, causing damages to the environment.

### 13. CONSIDERATIONS ABOUT TREATMENT AND DISPOSAL

- Treatment and disposal methods for product, wastes and used packages:  
Any wastes treatment should be in accordance with local and national regulation.

### 14. TRANSPORTATION INFORMATION

- National and international regulations:  
Follow hazardous goods road transportation regulation according to Decree n° 96044, 05/18/88 and their updatings; Resolution ANTT 420/04 and their updatings.  
Follow hazardous goods ferroviário transportation regulation according to Decree n° 98973, 02/21/90 and their updatings; Resolution ANTT 420/04 and their updatings .  
Follow Mercosur hazardous goods transportation regulation according to Decree n° 1797, 01/25/96 and their updatings.
- Road transportation (Brazil and MERCOSUR):  
**Solid:** it is not comprised by current Decree about hazardous goods transportation, Resolution ANTT 420/04, Especial Provision 242; and updatings; Transportation Ministry, Decree n. 96.044/88 and their updatings.

#### **Molten:**

**Proper name for shipping: Sulphur, molten**

**Risk Class: flammable solid 4.1.**

**UN N°: 2448**

**Risk N°: 44**

**Packing Group: III**

- US DOT (terrestrial USA)  
Proper Shipping Name: Styrene Monomer, Inhibited  
Hazard Class: 3  
UN/NA: UN 2055  
Packing Group: III  
Information reported for product/size: 20L.
- Marine transportation (International IMO/IMDG):  
Proper Shipping Name: Sulphur, Molten  
Class: 4.1  
  
Packing Group: III  
IBC Instructions: IBC01  
EmS: F-A, S-H.  
Stowage and Segregation: Category C. "Separated from" class 5.1.

- Aerial transportation (international – IATA/DGR)  
Transportation not allowed.

## 15. REGULATIONS

Transportation: follow item 14.  
Consult related national and international regulation.  
Consult Brazilian Standards related to the product.

## 16. OTHER INFORMATION

References:

-MSDS - GENIUM PUBLISHING CORP. (n.º 50 (05/86), 52(04/88) and 56(08/88))

-PCRAQ/SEOPE-C – U-910A (01/92)

-Elekeiroz specifications.

-IATA/DGR – International Air Transport Association – Edition 2007.

-IMO/IMDG – International Maritime Dangerous Goods – Edition 2006.

-Manual ACGIH, Portuguese version, 2006 (translation: ABHO).

-Commented Regulatory Standards – Occupational Health and Safety Regulation Volume I – Press GVC 2005.

Observation:

The information contained in this MSDS are offered in good faith and as guide tool, without incurring expressed or implicit liability. If clearings or additional information are needed, consult the manufacturer.