

Date 11.11.2013  
Version 1.0

### Sulfur (S)

The Global Product Strategy (GPS) Safety Summary gives an overview of information on chemical products in the framework of the International Council of Chemicals Association (ICCA) initiative and is focused on the products' basic characteristics related to safe use. All the information for health, safety and environment for this specific product can be found in the extended Safety Data Sheet (e- SDS) provided by Hellenic Petroleum SA to its customers.

#### GENERAL INFORMATION

Sulfur is solid, in the form of yellow powder and stable under normal conditions. It is used in industrial, professional and consumer applications. Sulfur has skin irritating properties but has no other acute or chronic systemic effect in human and no effect in the environment. If the recommendations under the section below "Risk Management Measures" are applied, the substance can be handled safely.

#### CHEMICAL IDENTITY

Name	Sulfur
Trade name	Sulfur
IUPAC Name	Sulfur
CAS Number	7704-34-9
EC Number	231-722-6
Molecular formula	S

#### USES AND APPLICATIONS

Sulfur's main use is as a reactant in the production of sulfuric acid (H<sub>2</sub>SO<sub>4</sub>). Sulfur is also used for the production of rubber, explosives, fireworks, matches and in the manufacture of agrochemicals.

Sulfur is obtained by oxidation of hydrogen sulfide which is extracted in the de-sulfurisation processes of oil refinery systems, natural gas, gas from coke manufacture, synthesis of gas or biogas. In nature sulfur can be found as the pure element in volcanic regions.

#### PHYSICAL AND CHEMICAL PROPERTIES

Sulfur is a yellow powder, with characteristic odour. It is not volatile, does not dissolve in water and has no flammable, explosive or oxidizing properties. Hazardous combustion products include sulfur oxides and hydrogen sulfide.

Property	Value
Physical State	Powder
Color	Yellow
Odour	Characteristic
Density	2,07g/cm <sup>3</sup> (20 <sup>0</sup> C)
Boiling point	444,6 <sup>0</sup> C
Melting point	113-120 <sup>0</sup> C
Flash point	168 <sup>0</sup> C
Explosive properties	No explosive properties
Self-ignition temperature	Not applicable
Vapor pressure	0,00014Pa (20 <sup>0</sup> C)
Water solubility	<0,000005 g/l
Viscosity (kinematic)	Not applicable
Octanol-Water partition coefficient (logKow)	Not applicable

#### HEALTH EFFECTS

##### Human health hazard assessment

After ingestion, sulfur is transformed into hydrogen sulfide probably by the intestinal micro flora and then into sulfate. Other ions containing sulfur may be formed as well. These sulfur compounds may be absorbed and incorporated into endogenous sulfur containing molecules. Sulfur is irritating to the skin. The substance is not a skin sensitizer, is not expected to cause genetic effects or cancer. No effects are expected on fertility, conception and fetal development. The table below gives an overview of the health effects assessment results for sulfur.

Effect Assessment	Result
Acute toxicity Oral/Inhalation/dermal	Irritant to skin and mucous membranes
Irritation/corrosion Skin/eye/respiratory tract	Irritating to skin. Not irritating to eyes or respiratory tract.
Sensitization	Negative
Toxicity after repeated exposure Oral/dermal/inhalation	No available data
Genotoxicity/mutagenicity	Negative
Carcinogenicity	Not scientifically necessary test (REACH Annex X)
Toxic for reproduction	Not scientifically necessary test (REACH Annex X)

## ENVIRONMENTAL EFFECTS

When released in the environment, sulfur deposits since it is not volatile and does not dissolve in water. Sulfur does not have a potential for bioaccumulation. Although used as a fungicide in organic farming and natural insecticide, sulfur is not considered harmful or toxic for the environment. The table below gives an overview of the environmental assessment results for sulfur.

Effect Assessment	Result
Aquatic Toxicity	Not harmful to water organisms
Fate and behavior	Result
Biodegradation	Not applicable, substance is inorganic
Bioaccumulation potential	Not bio-accumulative
PBT/vPvB conclusion	Neither considered to be PBT nor vPvB

## EXPOSURE

### Human health

Apart from skin irritating properties, sulfur has no acute or chronic systemic effect. Health risks following exposure are therefore considered low.

**Worker:** Exposure can occur in a manufacturing or formulation facility, during storage, transport and delivery of sulfur. Occasional exposure for all identified uses is controlled when used in closed processes.

**Consumer:** Exposure of consumers can occur due to the use of sulfur or sulfur containing articles in open small applications or processes.

### Environment

Considering its manufacture and use, sulfur could be released in the environment. No significant release into the air is expected. In view of the uses of sulfur, exposure of the environment can occur due to the intended use or the accidental release of sulfur containing articles in the environment.

## RISK MANAGEMENT MEASURES

For the detailed Risk Management Measures (RMMs) please consult the extended Safety Data Sheet of this product.

### Industry use, production and formulation

Sulfur should only be handled by knowledgeable and trained personnel. Make sure that there is adequate ventilation at workplace. Do not eat, drink or smoke where sulfur is handled or stored. Cleaning, inspection and maintenance of storage tanks must be done only by properly equipped and qualified personnel. In cases where engineering controls cannot maintain airborne substance concentrations below exposure limits or in cases with a risk of accidental exposure, use protective work clothing, gloves and masks with filters against particles.

### Consumer use


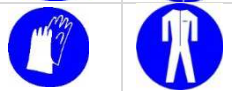

Adult consumer use only. Wear gloves if hand contact is likely to occur. When used in agrochemicals, for each use event,

recommended amounts up to 2500g, up to 1 day/year, skin contact area up to 857,5cm<sup>2</sup>.


### Environment

Prevent entry into waterways or sewers. Co-disposal of sulfur waste with municipal solid waste is not an acceptable practice. Comply with national legislation for the disposal.

### PERSONAL PROTECTIVE EQUIPMENT AND EMERGENCY MEASURES

	<ul style="list-style-type: none"> <li>➤ For short term exposure: mask with filter for particles.</li> <li>➤ For long term exposure: full face respirator.</li> </ul>
	<ul style="list-style-type: none"> <li>➤ Protective gloves and protective overall.</li> </ul>
	<ul style="list-style-type: none"> <li>➤ Safety glasses skintight.</li> </ul>
<b>First aid measures</b>	<ul style="list-style-type: none"> <li>➤ Implement emergency response procedures. Wash affected skin and eyes with plenty of water. Contaminated clothing and footwear should be removed. In case of Inhalation of dust sulfur remove casualty to a quiet and well ventilated place. If casualty is not breathing give external cardiac massage and call a doctor.</li> </ul>
<b>Firefighting measures</b>	<ul style="list-style-type: none"> <li>➤ Suitable extinguishing media: foam, water fog, dry chemical powder, inert gases, sand or earth.</li> <li>➤ Unsuitable extinguishing media: do not use water jets, simultaneous use of foam and water on the same surface must be avoided.</li> </ul>
<b>Accidental release measures</b>	<ul style="list-style-type: none"> <li>➤ For containment: Shovel solid sulfur into containers with covers. When spilled in molten form, contain by using natural deep water pockets and sand bag barriers or contain by forming mechanical or chemical barriers and let it solidify.</li> <li>➤ For clean up: Remove trapped material with suction hoses. If removal is not possible, let it solidify and apply a cover material preferably inert and basic (limestone) to the spilled area until recovery.</li> </ul>

### CLASSIFICATION AND LABELLING

EU-GHS Criteria (European Regulation, CLP No1272/2008)	Sulfur
Pictograms	
Signal word	GHS07
Hazard class and category code	Warning Skin Irrit.2; H315
Hazard statement code	H315 Causes skin irritation
Precautionary statements	<i>Prevention</i> P280 Wear protective gloves/protective clothing/eye protection/face protection <i>Response</i> P332+P313 If skin irritation occurs: Get medical advice / attention P302+P352 IF ON SKIN : Wash with plenty of soap and water

### BASIC TRANSPORT INFORMATION

UN Number : 1350 (at solid state) , 2448 (molten sulfur)

### STATE AGENCY REVIEW

- European Regulation EU-GHS No. 1272/2008, Index-No. 016-094-00-1
- This substance was not listed in a priority list (under Council Regulation (EEC) No 793/93 on the evaluation and

- control of the risks of existing substances)
- The substance has been registered under REACH Regulation No 1907/2008
- International Chemical Safety Cards (ICSC)

### CONCLUSIONS

- Sulfur is an inorganic substance in the form of yellow powder, used in various industrial, professional and consumer applications.
- Sulfur causes skin irritation with no other systemic effect for human health. It is not toxic to aquatic and terrestrial organisms.
- By applying the appropriate Risk Management Measures, the risks are managed and the safe use of the substance is ensured.

### CONTACT INFORMATION

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- For more information on the GPS Safety Summaries follow the link :  
<http://www.icca-chem.org/en/Home/ICCA-initiatives/global-product-strategy/>

### ABBREVIATIONS

ICCA :International Council of Chemical Associations

GPS: Global Product Strategy

GHS: Globally Harmonized System

CLP: Classification, Labelling, Packaging

REACH: Registration, Evaluation, Authorisation of Chemicals

PBT/vPvB: Persistent, Bio accumulative and Toxic/very Persistent and very Bio accumulative

UN: United Nations

### DISCLAIMER

All information and recommendations provided in this GPS Safety Summary, only concern the specific product as described above, and may not apply for the same material if used in combination with any other material or in any process. They are provided in good faith as recommendations only, and are based on data which Hellenic Petroleum SA has available on the above date. They do not supersede or replace required documents by National or European Legislation. However, Hellenic Petroleum SA cannot guarantee their accuracy and validity and accepts no responsibility for any damage or loss that might arise in connection with the use of this material.