

MATERIAL SAFETY DATA SHEET

According to Regulation (EC) no. 1907/2006

SULPHUR (FORMED/SOLID)

Page 1 of 21

Product: SULPHUR

Revised : 15/02/2018

Version: 2.1

Supersedes: 09/09/2012



1. Identification of the substance / preparation and of the company / undertaking

| | |
|---------------------|--|
| Name of the product | SULPHUR (FORMED/SOLID) |
| Chemical name | SULPHUR |
| Material Use | Used in the manufacturing of sulfuric acid, carbon disulfide, sulfites, insecticides, plastics, enamels, metal-glass cements; in vulcanizing rubber; syntheses of dyes; making gun powder and matches. |

RESPONSIBLE FOR PLACING ON THE MARKET

Trade name of the firm see below this page.

COMPANY INFORMATION

| | |
|---------------------------|--|
| Company Name | Qatar Petrochemical Company. (QAPCO) P.O.BOX 756, DOHA – QATAR |
| Emergency Contact Details | For Spill, Leak, Fire, Exposure, or Accident Call CHEMTREC Day or Night Within USA and Canada: 1-800-424-9300 CCN724450 Outside USA and Canada: +1 703-741-5970 and +1-703-527-3887 (collect calls accepted) |

2. Hazards identification

Qatar Petrochemical Company (QAPCO) Q.P.J.S.C.

MAIN OFFICE : P.O.Box 756, Doha, Qatar. Tel : (+974) 4033 8000, Fax : (+974) 4432 4700

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Emergency Overview

WARNING! FLAMMABLE SOLID. DUST MAY FORM FLAMMABLE OR EXPLOSIVE MIXTURE WITH AIR. MAY BE HARMFUL IF SWALLOWED OR INHALED. CAUSES EYE IRRITATION. MAY CAUSE IRRITATION TO SKIN AND RESPIRATORY TRACT.

Symptoms related to use

Inhalation

May cause irritation of the respiratory tract with burning pain in the nose and throat, coughing, wheezing, shortness of breath and pulmonary edema. Olfactory fatigue may occur. Can produce delayed pulmonary edema.

Skin contact

May cause skin irritation and possible burns.

Eye contact

Causes eye irritation. Effects may be delayed. May cause lacrimation tearing, blurred vision, and photophobia. May cause chemical conjunctivitis and corneal damage..

Ingestion

May cause gastrointestinal irritation with nausea, vomiting and diarrhea.

Chronic Exposure

Prolonged overexposure to sulfur dust can produce possible skin sensitization and permanent eye damage(clouding of the lens and chronic irritation). Prolonged inhalation can cause irritation of mucous membranes.

3. Composition / information on ingredients

SULFUR -

99.80 % wt min. (dry basis), No TLV established
The Nuisance Dust Recommendation should govern exposure to solid sulfur in the absence of other standards.

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For Nuisance Dusts: OSHA = 15 mg/m³ (total) or 5 mg/m³ (respirable); ACGIH = 10 mg/m³ (total dust) or 5 mg/m³ (respirable dust).

Hydrogen Sulfide: OSHA 8 HR TWA*: 10 ppm; STEL*: 15 ppm; 8 HR ACC 20 ppm; or PEAK of 50 ppm (10 minutes, once, if no other measurable exposure occurs in 8 HR shift).

ACGIH TLV-TWA 10 ppm; TLV-STEL 15 ppm (15 minutes not more than 4 times per 8 hr day).

[Manufacturer Recommendation on H₂S, to avoid eye irritation: 10 ppm].

[Abbreviations Key: mg/m³ designates milligrams per cubic meter; ppm designates parts per million (volume). ACC designates Acceptable Ceiling Concentration; TWA designates Time Weighted Average; STEL designates Short Term Exposure Limit; TLV designates Threshold Limit Value].

| | |
|-------------------------|-----------|
| Chemical formula | S |
| CAS number | 7704-34-9 |
| EINECS or ELINCS number | 231-722-6 |

4. First-aid measures

Route of exposure

SWALLOWED

Immediately give a glass of water.

- First aid is not generally required. If in doubt, contact a Poisons Information Centre or a doctor.

EYE

If this product comes in contact with the eyes:

- Wash out immediately with fresh running water.
- Ensure complete irrigation of the eye by keeping eyelids apart and away from eye and moving the eyelids by occasionally lifting the upper and lower lids.
- If pain persists or recurs seek medical attention.
- Removal of contact lenses after an eye injury should only be undertaken by skilled personnel.

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SKIN

If skin contact occurs:

- Immediately remove all contaminated clothing, including footwear.
- Flush skin and hair with running water (and soap if available).
- Seek medical attention in event of irritation.

INHALED

If fumes or combustion products are inhaled remove from contaminated area.

- Other measures are usually unnecessary.

NOTES TO PHYSICIAN

Treat symptomatically and supportively.

5. Fire - fighting measures

EXTINGUISHING MEDIA

Incipient fires in sulfur storage piles can be frequently smothered by gently shoveling more sulfur, sand, or fine earth on them to exclude all air.

For larger fires, water applied as a fine mist is the most useful agent. High pressure water sprays disperse the dust into the air and should NOT be used. Coarser water sprays are permissible on deposits containing only a small proportion of extreme sulfur fines. Large fires can be smothered by experts using additional sulfur (since SO₂ decomposition product does not support combustion). Steam or inert gases (such as carbon dioxide) are excellent extinguishers for use in containers that can be closed tightly. Care should be taken that the sulfur dust is not scattered into the air. If a container is closed tightly and the volume of oxygen enclosed is not too large, a fire will be put out by the sulfur dioxide formed. Sulfur dioxide is a toxic gas.

For SMALL FIRES:

Dry chemical, CO₂, water spray or foam.

For LARGE FIRES:

Water-spray, fog or foam.

FIRE FIGHTING

For fires involving sulfur:

Do not use solid streams of water; which could create sulfur dust clouds and cause an explosion or move burning sulfur to adjacent areas. Fire will rekindle until mass is cooled below 145 C.

Cool containers, tank cars, or trailer loads with flooding quantities of water until well after fire is out.

Once a fire is controlled, post fire watch for at least 4 hours. Small fires are easy to miss and can linger for hours. Re-ignition may occur.

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Firemen exposed to contaminated smoke should be immediately relieved and checked for symptoms of exposure to toxic gasses. Seek medical attention immediately.

This should not be mistaken for heat exhaustion or smoke inhalation.

These are extremely irritating to the respiratory tract and may cause breathing difficulty and pulmonary edema. Symptoms may be delayed

Alert Fire Brigade and tell them location and nature of hazard.

Wear breathing apparatus plus protective gloves.

Prevent, by any means available, spillage from entering drains or water course.

Fight fire from a safe distance, with adequate cover.

If safe, switch off electrical equipment until vapour fire hazard removed.

Use water delivered as a fine spray to control fire and cool adjacent area.

Avoid spraying water onto liquid pools.

DO NOT approach containers suspected to be hot.

Cool fire exposed containers with water spray from a protected location.

If safe to do so, remove containers from path of fire.

FIRE/EXPLOSION HAZARD

Flammable solid which burns and propagates flame easily, even when partly wetted with water.

Any source of ignition, i.e. friction, heat, sparks or flame, may cause fire or explosion.

May burn fiercely

May form explosive mixtures with air.

May REIGNITE after fire is extinguished.

Containers may explode on heating.

Solids may melt and flow when heated or involved in a fire.

Runoff may pollute waterways.

Avoid generating dust, particularly clouds of dust in a confined or unventilated space

- As dusts may form an explosive mixture with air. Dust clouds generated by the fine grinding of the solid are a particular hazard; accumulations of fine dust may burn rapidly and fiercely if ignited.

Dry dust can be charged electrostatically by turbulence, pneumatic transport, pouring, in exhaust ducts and during transport, thereby providing a source of ignition.

Decomposition products may be irritating, poisonous or corrosive.

Decomposition may produce toxic fumes of: sulfur oxides (SO_x), sulfur dioxide (SO₂).

NOTE: Burns with intense heat. Produces melting, flowing, burning liquid and dense acrid black smoke.

Sulfur fires are deep blue at night, with very short flames. Fire is invisible by daylight except for smoke and heat. Burning material, however, turns a deep red-black.

FIRE INCOMPATIBILITY

None known.

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6. Accidental release measures

EMERGENCY PROCEDURES MINOR SPILLS

Remove all ignition sources.
DO NOT touch or walk through spilled material.
Clean up all spills immediately.
Avoid contact with skin and eyes.
Prevent dust cloud.
With clean shovel (preferably non-sparking) place material into clean, dry container and cover loosely.
Move containers from spill area.
Control personal contact by using protective equipment.

MAJOR SPILLS

Sulfur dusts form an explosive mixture with air which may be ignited by static electricity. Explosion may be avoided by preventing atmospheres becoming dust-laden by adequate ventilation or by hose-down instead of sweeping.
If mixture with incompatible materials is likely, evacuate personnel to a safe distance.
Keep product moist to suppress both fire and dust potential.
Recover material without delay using non-sparking hand tools.
Place recovered materials in clean, labeled closed containers.
Keep contents damp.
Clear area of personnel and move upwind.
Alert Fire Brigade and tell them location and nature of hazard.
DO NOT touch or walk through spilled material.
Control personal contact by using protective equipment.
Prevent, by any means available, spillage from entering drains or water course.
No smoking, naked lights or ignition sources.
Increase ventilation.
Stop leak if safe to do so.
Contain or cover with sand, earth or vermiculite.
Use only spark-free shovels and explosion proof equipment.
Collect recoverable product into labeled containers for recycling.
Collect solid residues and seal in labeled drums for disposal.
Wash area with water and dike for later disposal; prevent runoff into drains.
After clean up operations, decontaminate and launder all protective clothing and equipment before storing and re-using.
If contamination of drains or waterways occurs, advise emergency services.

PROTECTIVE ACTIONS FOR SPILL

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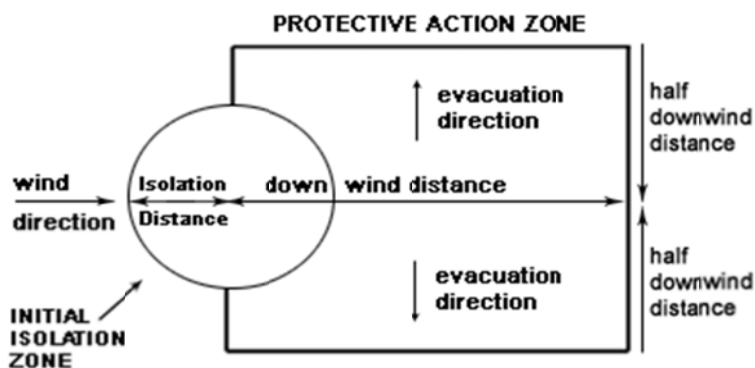
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From IERG (Canada/Australia)

Isolation Distance 5 meters

Downwind Protection Distance 50 meters

IERG Number 0

1 .PROTECTIVE ACTION ZONE is defined as the area in which people are at risk of harmful exposure. This zone assumes that random changes in wind direction confines the vapour plume to an area within 30 degrees on either side of the predominant wind direction, resulting in a crosswind protective action distance equal to the downwind protective action distance.

2 .PROTECTIVE ACTIONS should be initiated to the extent possible, beginning with those closest to the spill and working away from the site in the downwind direction. Within the protective action zone a level of vapour concentration may exist resulting in nearly all unprotected persons becoming incapacitated and unable to take protective action and/or incurring serious or irreversible health effects.

3 .INITIAL ISOLATION ZONE is determined as an area, including upwind of the incident, within which a high probability of localized wind reversal may expose nearly all persons without appropriate protection to life-threatening concentrations of the material.

4 .SMALL SPILLS involve a leaking package of 200 liters (55 US gallons) or less, such as a drum (jerrican or box with inner containers). Larger packages leaking less than 200 liters and compressed gas leaking from a

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small cylinder are also considered "small spills". LARGE SPILLS involve many small leaking packages or a leaking package of greater than 200 liters, such as a cargo tank, portable tank or a "one-ton" compressed gas cylinder.

5 .Guide 133 is taken from the US DOT emergency response guide book.

6 .IERG information is derived from CANUTEC - Transport Canada.
Personal Protective Equipment advice is contained in Section 8 of the MSDS.

7. Handling and storage

PROCEDURE FOR HANDLING

- Taking precautions to prevent sparking when tank covers are released.
- Open slowly and allow tanks to vent accumulated highly flammable hydrogen sulfide gas if present
- Avoid all personal contact, including inhalation.
- Wear protective clothing when risk of overexposure occurs.
- Use in a well-ventilated area.
- Prevent concentration in hollows and sumps.
- DO NOT allow material to contact humans, exposed food or food utensils.
- Avoid smoking, naked lights or ignition sources.
- When handling, DO NOT eat, drink or smoke.
- Avoid contact with incompatible materials.
- Keep containers securely sealed when not in use.
- Avoid physical damage to containers.
- Always wash hands with soap and water after handling.
- Working clothes should be laundered separately. Launder contaminated clothing before re-use.
- Use good occupational work practice.
- Observe manufacturer's storing/handling recommendations.
- Atmosphere should be regularly checked against established exposure standards to ensure safe working conditions are maintained.

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SUITABLE CONTAINER

- Glass container is suitable for laboratory quantities for low viscosity materials and solids: Drums and jerricans must be of the non-removable head type. Where a can is to be used as an inner package, the can must have a screwed enclosure. For materials with a viscosity of at least 2680 cSt. (23 deg. C):
- Removable head packaging and
- Cans with friction closures may be used.

Where combination packages are used, there must be sufficient inert absorbent material to absorb completely any leakage that may occur, unless the outer packaging is a close fitting moulded plastic box and the substances are not incompatible with the plastic.

All combination packages for Packing group I and II must contain cushioning material.

STORAGE INCOMPATIBILITY

Sulfur:

- is both an oxidizing agent and a reducing agent
- when finely divided and dry, forms explosive mixtures with air
- is a flammable substance in both the solid and liquid states; the dust is characterized by a very low ignition point of 190 C compared to other combustible dusts - dust clouds are readily ignited by weak frictional sparks if the oxygen content is above 8%.
- vapours react violently with lithium carbide.
- Forms explosive and extremely sensitive mixtures with most oxidizing substances such as chlorates, nitrates, perchlorates and permanganates; mixtures may be extremely sensitive to friction or vibration.
- reacts violently with many substances, including strong oxidisers, aluminium powders, boron, bromine pentafluoride, bromine trifluoride, calcium hypochlorite, carbides, caesium, chlorates, chlorine dioxide, chlorine trifluoride, chromic acid, chromyl chloride, dichlorine oxide, diethylzinc, fluorine, halogen compounds, hexalithium disilicide, lampblack, lead chlorite, lead dioxide, lithium powdered nickel, nickel catalysts, red phosphorus, phosphorus trioxide, potassium, potassium chlorite, potassium iodate, potassium peroxoferrate, rubidium acetylide, ruthenium tetroxide, sodium, sodium chlorite, sodium peroxide, tin, uranium, zinc, zinc(II) nitrate, hexahydrate
- forms friction-, impact- and shock- sensitive explosive or pyrophoric mixtures with ammonia, ammonium nitrate, barium bromate, bromates, calcium carbide, charcoal, hydrocarbons, iodates, iodine pentafluoride, iodine pentoxide, iron, lead chromate, mercurous oxide, mercury nitrate, mercury oxide, nitryl fluoride, nitrogen dioxide, inorganic perchlorates, potassium bromate, potassium nitride, potassium perchlorate, silver nitrate, sodium hydride, sulfur dichloride

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- is incompatible with barium carbide, calcium, calcium carbide, calcium phosphide, chromates, chromic acid, chromic anhydride, 1,5-dinitronaphthalene, hafnium, indium, iodates, iodic acid, iodine oxide, lead chlorate, lithium acetylide, mercury oxide, mercuric nitrate, palladium, potassium permanganate, silver bromate, silver chlorate, silver oxide, sodium, strontium carbide, thallium oxide, thorium, thorium dicarbide
- attacks copper, mercury, silver
- may accumulate static electrical charges; vapours may ignite.

NOTE: Dusts containing 25% or more elemental sulfur may be almost as explosive as pure sulfur.

Sulfur will form sulfides with most metals, including iron, and reacts vigorously with metals in the sodium and magnesium groups on the periodic table. Sulfides of iron will oxidise fairly rapidly in moist air. In the presence of other readily oxidised combustibles (such as some oily materials) under certain conditions, the heat liberated may be sufficient to result in spontaneous ignition. This phenomenon has not been observed with pure sulfur products or disintegrating sulfur in contact with unprotected steel at ordinary ambient temperatures.

Inadvertent mixtures of sulfur, iron, and miscellaneous oils should be avoided.. Oxidation is accelerated by higher temperatures. Heat buildup and ignition can be prevented by keeping the sulfides wet until oxidation is complete.

STORAGE REQUIREMENTS

FOR MINOR QUANTITIES:

- Store in an indoor fireproof cabinet or in a room of noncombustible construction.
- Provide adequate portable fire-extinguishers in or near the storage area.

FOR PACKAGE STORAGE:

- Store in original containers in approved flame-proof area.
- No smoking, naked lights, heat or ignition sources.
- DO NOT store in pits, depressions, basements or areas where vapours may be trapped.
- Keep containers securely sealed.
- Store away from incompatible materials in a cool, dry, well ventilated area.
- Protect containers against physical damage and check regularly for leaks.
- Protect containers from exposure to weather and from direct sunlight unless: (a) the packages are of metal or plastic construction; (b) the packages are securely closed are not opened for any purpose while in the area where they are stored and (c) adequate precautions are taken to ensure that rain water, which might become contaminated by the dangerous goods, is collected and disposed of safely.

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- Ensure proper stock-control measures are maintained to prevent prolonged storage of dangerous goods. Observe manufacturer's storing and handling recommendations.

SAFE STORAGE WITH OTHER CLASSIFIED CHEMICALS



+ X + X X +

X: Must not be stored together

O: May be stored together with specific preventions

+: May be stored together

8. Exposure controls / personal protection

Exposure controls

| Source | Material | TWA ppm | TWA mg/m ³ | STEL ppm | STEL mg/m ³ | Peak ppm | Peak mg/m ³ | TWA F/CC | Notes |
|--------------------|---|------------|--------------------------|-------------|---------------------------|-------------|---------------------------|-------------|-------|
| Exposure Standards | sulfur (Inspirable dust (not otherwise classified)) | | 10 | | | | | | |

MATERIAL DATA SULFUR:

Sensory irritants are chemicals that produce temporary and undesirable side-effects on the eyes, nose or throat. Historically occupational exposure standards for these irritants have been based on observation of workers' responses to various airborne concentrations. Present day expectations require that nearly every individual should be protected against even minor sensory irritation and exposure standards are established using uncertainty factors or safety factors of 5 to 10 or more. On occasion animal no-observable-effect-levels (NOEL) are used

to determine these limits where human results are unavailable. An additional approach, typically used by the TLV committee (USA) in determining respiratory standards for this group of chemicals, has been to assign ceiling values (TLV C) to rapidly acting irritants and to assign short-term exposure limits (TLV STELs) when

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the weight of evidence from irritation, bioaccumulation and other endpoints combine to warrant such a limit. In contrast the MAK Commission (Germany) uses a five-category system based on intensive odour,

Local irritation and elimination half-life. However this system is being replaced to be consistent with the European Union (EU) Scientific Committee for Occupational Exposure Limits (SCOEL); this is more closely allied to that of the USA.

OSHA (USA) concluded that exposure to sensory irritants can:

- cause inflammation
- cause increased susceptibility to other irritants and infectious agents
- lead to permanent injury or dysfunction
- permit greater absorption of hazardous substances and
- Acclimate the worker to the irritant warning properties of these substances thus increasing the risk of overexposure.

It is the goal of the ACGIH (and other Agencies) to recommend TLVs (or their equivalent) for all substances for which there is evidence of health effects at airborne concentrations encountered in the workplace.

At this time no TLV has been established, even though this material may produce adverse health effects (as evidenced in animal experiments or clinical experience). Airborne concentrations must be maintained as low as is practically possible and occupational exposure must be kept to a minimum.

NOTE: The ACGIH occupational exposure standard for Particles Not Otherwise Specified (P.N.O.S) does NOT apply.

PERSONAL PROTECTION



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EYE

- Safety glasses with side shields.
- Chemical goggles.
- Contact lenses may pose a special hazard; soft contact lenses may absorb and concentrate irritants. A written policy document, describing the wearing of lens or restrictions on use, should be created for each workplace or task. This should include a review of lens absorption and adsorption for the class of chemicals in use and an account of injury experience. Medical and first-aid personnel should be trained in their removal and suitable equipment should be readily available. In the event of chemical exposure, begin eye irrigation immediately and remove contact lens as soon as practicable. Lens should be removed at the first signs of eye redness or irritation - lens should be removed in a clean environment only after workers have washed hands thoroughly. [CDC NIOSH Current Intelligence Bulletin 59]

HANDS/FEET

NOTE:

- The material may produce skin sensitization in predisposed individuals. Care must be taken, when removing gloves and other protective equipment, to avoid all possible skin contact.
 - Contaminated leather items, such as shoes, belts and watch-bands should be removed and destroyed.
- Suitability and durability of glove type is dependent on usage. Factors such as:

- frequency and duration of contact,
- chemical resistance of glove material,
- glove thickness and
- dexterity,

are important in the selection of gloves.

- Wear physical protective gloves, eg. Leather.
- Wear safety footwear.

OTHER

- Overalls.
- Eyewash unit.
- Barrier cream.
- Skin cleansing cream.
- Some plastic personal protective equipment (PPE) (e.g. gloves, aprons, overshoes) are not recommended as they may produce static electricity.
- For large scale or continuous use wear tight-weave non-static clothing (no metallic fasteners, cuffs or pockets), non sparking safety footwear.
- Respirators may be necessary when engineering and administrative controls do not adequately prevent exposures.

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- The decision to use respiratory protection should be based on professional judgment that takes into account toxicity information, exposure measurement data, and frequency and likelihood of the worker's exposure - ensure users are not subject to high thermal loads which may result in heat stress or distress due to personal protective equipment (powered, positive flow, full face apparatus may be an option).
- Published occupational exposure limits, where they exist, will assist in determining the adequacy of the selected respiratory. These may be government mandated or vendor recommended.
- Certified respirators will be useful for protecting workers from inhalation of particulates when properly selected and fit tested as part of a complete respiratory protection program.
- Use approved positive flow mask if significant quantities of dust becomes airborne.

Try to avoid creating dust conditions.

RESPIRATOR

| Protection Factor | Half-Face Respirator | Full-Face Respirator | Powered Air Respirator |
|-------------------|----------------------|----------------------|------------------------|
| 10 x ES | P1 Air-line* | - | PAPR-P1 - |
| 50 x ES | Air-line** | P2 | PAPR-P2 |
| 100 x ES | - | P3 | - |
| | | Air-line* | - |
| 100+ x ES | - | Air-line** | PAPR-P3 |

* - Negative pressure demand ** - Continuous flow.

The local concentration of material, quantity and conditions of use determine the type of personal protective equipment required.

For further information consult site specific CHEMWATCH data (if available), or your Occupational Health and Safety Advisor.

ENGINEERING CONTROLS

For large scale or continuous use:

- Spark-free, earthed ventilation system, venting directly to the outside and separate from usual ventilation systems
- Provide dust collectors with explosion vents
- Local exhaust ventilation is required where solids are handled as powders or crystals; even when particulates are relatively large, a certain proportion will be powdered by mutual friction.
- Exhaust ventilation should be designed to prevent accumulation and recirculation of particulates in the workplace.
- If in spite of local exhaust an adverse concentration of the substance in air could occur, respiratory protection should be considered. Such protection might consist of:
 - particle dust respirators, if necessary, combined with an absorption cartridge;
 - filter respirators with absorption cartridge or canister of the right type;
 - fresh-air hoods or masks

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- Build-up of electrostatic charge on the dust particle may be prevented by bonding and grounding.
- Powder handling equipment such as dust collectors, dryers and mills may require additional protection measures such as explosion venting.

Air contaminants generated in the workplace possess varying "escape" velocities which, in turn, determine the "capture velocities" of fresh circulating air required to efficiently remove the contaminant.

| Type of Contaminant: | Air Speed: |
|--|------------------------------|
| direct spray, spray painting in shallow booths, drum filling, conveyer loading, crusher dusts, gas discharge (active generation into zone of rapid air motion) | 1-2.5 m/s (200-500 f/min.) |
| Grinding, abrasive blasting, tumbling, high speed wheel generated dusts (released at high initial velocity into zone of very high rapid air motion). | 2.5-10 m/s (500-2000 f/min.) |
| Within each range the appropriate value depends on: | |

| Lower end of the range | Upper end of the range |
|---|----------------------------------|
| 1: Room air currents minimal or favourable to capture | 1: Disturbing room air currents |
| 2: Contaminants of low toxicity or of nuisance value only | 2: Contaminants of high toxicity |
| 3: Intermittent, low production. | 3: High production, heavy use |
| 4: Large hood or large air mass in motion | 4: Small hood-local control only |

Simple theory shows that air velocity falls rapidly with distance away from the opening of a simple extraction pipe.

Velocity generally decreases with the square of distance from the extraction point (in simple cases). Therefore the air speed at the extraction point should be adjusted, accordingly, after reference to distance from the contaminating source. The air velocity at the extraction fan, for example, should be a minimum of 4-10 m/s (800-2000 f/min) for extraction of crusher dusts generated 2 meters distant from the extraction point. Other mechanical considerations, producing performance deficits within the extraction apparatus, make it essential that theoretical air velocities are multiplied by factors of 10 or more when extraction systems are installed or used.

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9. Physical and chemical properties

GENERAL INFORMATION

Appearance

Yellow fine granules; insoluble in water. Slightly soluble in alcohol and ether. Soluble in carbon disulfide, benzene and toluene Physical properties depend on allotropic forms present. Odorless, but impurities may cause H₂S smell. Sulfur is not subject to the provisions of the DG Code when it is transported in quantities of less than 400 kg per package, or when it has been formed into a specific shape (e.g. prills, granules, pellets, pastilles or flakes). [Special Provision]

Physical state

solid

Colour

yellow

Odour

Odourless, but impurities may cause H₂S smell

IMPORTANT HEALTH, SAFETY AND ENVIRONMENTAL INFORMATION

PHYSICAL PROPERTIES

Solid.

Does not mix with water.

Sinks in water.

| | |
|----------------------------------|----------------------------|
| Molecular Weight: | 32.06 |
| Specific Gravity (water=1): | 1.92-2.07 |
| PH (1% solution): | Not applicable. |
| Evaporation Rate: | Not Applicable |
| Lower Explosive Limit (%): | 35 g/m ³ dust |
| Decomposition Temp (°C): | Not Applicable |
| Boiling Range (°C): | 444.6 (IBP) |
| Solubility in water (g/L): | Insoluble |
| Vapour Pressure (kPa): | 0.133 @ 184 deg |
| Relative Vapour Density (air=1): | Not Applicable |
| Upper Explosive Limit (%): | 1400 g/m ³ dust |
| State: | Divided solid |
| Melting Range (°C): | 112.8-119 |
| pH (as supplied): | Not applicable |
| Volatile Component (%vol): | Nil |
| Flash Point (°C): | >180 (as dust) |
| Autoignition Temp (°C): | 232 (as dust) |
| Viscosity: | Not Applicable |

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CONDITIONS CONTRIBUTING TO INSTABILITY

- Presence of incompatible materials.
 - Product is considered stable.
- Hazardous polymerization will not occur.
For incompatible materials - refer to Section 7 - Handling and Storage.

11. Toxicological information

POTENTIAL HEALTH EFFECTS

ACUTE HEALTH EFFECTS

SWALLOWED

Although ingestion is not thought to produce harmful effects (as classified under EC Directives), the material may still be damaging to the health of the individual, following ingestion, especially where pre-existing organ (e.g. liver, kidney) damage is evident. Present definitions of harmful or toxic substances are generally based on doses producing mortality rather than those producing morbidity (disease, ill-health). Gastrointestinal tract discomfort may produce nausea and vomiting. In an occupational setting however, ingestion of insignificant quantities is not thought to be cause for concern.

Ingested sulfur is converted to sulfides in the gastrointestinal tract, and ingestion of 10 to 20 grams has caused irritation of the GI tract and renal injury. Individuals with known allergies to sulfide drugs may also have allergic reactions to elemental sulfur.

Swallowing large amounts may cause nausea and vomiting.

EYE

This material can cause eye irritation and damage in some persons.

SKIN

This material can cause inflammation of the skin on contact in some persons.

The material may accentuate any pre-existing dermatitis condition.

Skin contact is not thought to have harmful health effects (as classified under EC Directives); the material may still produce health damage following entry through wounds, lesions or abrasions.

INHALED

The material is not thought to produce adverse health effects or irritation of the respiratory tract (as classified by EC Directives using animal models). Nevertheless, good hygiene practice requires that exposure be kept to a

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minimum and that suitable control measures be used in an occupational setting.

There is no evidence that systemic poisoning results from inhalation of sulfur dust.

Sulfur vapour irritates both the upper and lower respiratory passages and if inhaled may cause coughing, conjunctivitis, nausea, vomiting and chest tightness, bronchitis and in extreme pulmonary oedema (sudden or delayed).

Persons with impaired respiratory function, airway diseases and conditions such as emphysema or chronic bronchitis, may incur further disability if excessive concentrations of particulate are inhaled.

If prior damage to the circulatory or nervous systems has occurred or if kidney damage has been sustained, proper screenings should be conducted on individuals who may be exposed to further risk if handling and use of the material result in excessive exposures.

CHRONIC HEALTH EFFECTS

there is limited evidence that, skin contact with this product is more likely to cause a sensitization reaction in some persons compared to the general population.

Sensitive persons can experience skin irritation from repeated exposure to the sulfur dust. Allergic responses can occur.

Long term exposure to high dust concentrations may cause changes in lung function i.e. pneumoconiosis; caused by particles less than 0.5 micron penetrating and remaining in the lung. Prime symptom is breathlessness; lung shadows show on X-ray.

TOXICITY AND IRRITATION

Unless otherwise specified data extracted from RTECS - Register of Toxic Effects of Chemical Substances.

TOXICITY

Oral (rat) LD50: >8437 mg/kg

Oral (rabbit) LDLo: 175 mg/kg

IRRITATION

Eye (human): 8 ppm Irritant

12. Ecological information

Refer to data for ingredients, which follows:

SULFUR:

Ecotoxicity

Ingredient

sulfur

Persistence:

Water/Soil
LOW

Persistence: Air

No data

Bioaccumulation

LOW

Mobility

HIGH

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13. Disposal considerations

Legislation addressing waste disposal requirements may differ by country, state and/ or territory. Each user must refer to laws operating in their area. In some areas, certain wastes must be tracked.

A Hierarchy of Controls seems to be common - the user should investigate:

- Reduction
- Reuse
- Recycling
- Disposal (if all else fails)
- This material may be recycled if unused, or if it has not been contaminated so as to make it unsuitable for its intended use. Shelf life considerations should also be applied in making decisions of this type. Note that properties of a material may change in use, and recycling or reuse may not always be appropriate.
- DO NOT allow wash water from cleaning or process equipment to enter drains.
- It may be necessary to collect all wash water for treatment before disposal.
- Where in doubt contact the responsible authority.
- Recycle wherever possible.
- Consult manufacturer for recycling options or consult local or regional waste management authority for disposal if no suitable treatment or disposal facility can be identified.
- Dispose of by: Burial in a licensed land-fill or Incineration in a licensed apparatus (after admixture with suitable combustible material)
- Decontaminate empty containers. Observe all label safeguards until containers are cleaned and destroyed.

14. Transport information

The shipping descriptions shown here are for bulk shipments only; Consult the appropriate domestic or international mode-specific and quantity-specific Dangerous Goods Regulations for additional shipping description requirements

Marine (IMO-IMDG):

PLEASE CONSULT IMSBC Code pages 271 & 272 (IMO London 2011) against UN: NA and Hazardous Class: NA.

49 CFR 172.101, Special Provision 30 – Sulfur -- "N ot Regulated if formed into a shape (eg. prills, granules, pellets, pastilles or flakes).

Maritime Transport IMSBC

IMSBC Group: C

Class: Not applicable

Additional Notes:

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49 CFR 172.101, Special Provision 30 – Sulphur -- “Not Regulated if transported in non-bulk or formed into a shape for example prills, granules, pellets, pastilles or flakes...”

IMO/IMDG Regulations: Sulphur is indicated in the IMDG Dangerous Goods List, Vol. 2.

it is to be noted that as per Chapter 3.3/3.3.1 of the IMDG code (amendments 35-10), **Special provisions applicable to certain substances, material or article, (242)**, clearly state that “Sulphur is not subject to the provision of this code when it has been formed to a specific shape such as prills, granules, pellets, pastilles or flakes”. Class 4.1 will not be required to be stated in the MSDS for sulphur (formed, solid)

15. Regulatory information

POISONS SCHEDULE None

REGULATIONS

sulfur (CAS: 7704-34-9) is found on the following regulatory lists; "Australia High Volume Industrial Chemical List (HVICL)", "Australia Inventory of Chemical Substances (AICS)", "GESAMP/EHS Composite List of Hazard Profiles - Hazard evaluation of substances transported by ships", "IMO IBC Code Chapter 17: Summary of minimum requirements", "IMO MARPOL 73/78 (Annex II) - List of Other Liquid Substances", "International Council of Chemical Associations (ICCA) - High Production Volume List", "OECD Representative List of High Production Volume (HPV) Chemicals"

16. Other information

HAZARD RATINGS

| | Min | Max |
|---------------|-----|------------|
| Flammability: | 2 | Min/Nil=0 |
| Toxicity: | 0 | Low=1 |
| Body Contact: | 2 | Moderate=2 |
| Reactivity: | 0 | High=3 |
| Chronic: | 2 | Extreme=4 |



Training advice

The use of this product requires specific training. The user must receive all product information in order to handle the product safely (personal protection equipment and best practice standards).

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Recommended uses Restricted to professional users.
Safety data sheet conforms to the Regulation (EU) N° 1907/2006

This information applies to the PRODUCT AS SUCH and conforming to specifications of QATAR PETROCHEMICAL COMPANY.

In case of formulations or mixtures, it is necessary to ascertain that a new danger will not appear.

The information contained is based on our knowledge of the product, at the date of publishing and it is given quite sincerely. However the revision of some data is in progress.

Users are advised of possible additional hazards when the product is used in applications for which it was not intended. This sheet shall only be used and reproduced for prevention and security purposes.

The references to legislative, regulatory and codes of practice documents cannot be considered as exhaustive.

It is the responsibility of the person receiving the product to refer to the totality of the official documents concerning the use, the possession and the handling of the product.

It is also the responsibility of the handlers of the product to pass on to any subsequent persons who will come into contact with the product. (usage, storage, cleaning of containers, other processes) the totality of the information contained within this safety data sheet and necessary for safety at work, the protection of health and the protection of environment.

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