Qatar Chemical Co. Ltd.

(Q-Chem)

SAFE HANDLING AND STORAGE GUIDELINES

SULPHUR (PRILLED)

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PRODUCT STEWARDSHIP

Qatar Chemical Company Ltd (Q-Chem) is committed to being a good product steward of the products we produce. We want anyone who comes in contact with one of our products to have access to information that will help them to understand its potential risk and how to use it safely. The thrust of our product stewardship program is the implementation of an Operation Excellence Management System (OEMS) initiative, which makes health, safety and environmental protection an integral part of our products. Successful implementation of this system must include a shared responsibility of all those who come in contact with a product throughout its life cycle. Qatar Chemical Company Ltd will continue to work with customers and others to help ensure that all who use and handle our products follow safe and environmentally sound practices.

The information contained in this document is not intended to, nor does it, amend or replace the Qatar Chemical Company Ltd Safety Data Sheet (SDS) for Sulphur. The most current SDS can be obtained from Qatar Chemical Company Ltd at www.qchem.com.qa and should be carefully examined prior to working with this product.

INTRODUCTION

Sulfur is produced as a by-product in Q-Chem operations when sour ethane is treated to remove H2S and CO2 from process gas. H2S removed is then processed further for converting sulfur compounds into liquid sulfur to be then converted into solid prilled form.

This document is intended to provide general information about safe handling and storage Sulfur in its solid form (prilled). It is not intended to provide an in-depth discussion of all health and safety information. Additional information on the product is available through the applicable Safety Data Sheet which should be consulted before use of the product.

SULPHUR SPECIFICATION

CHARACTERISTIC	METHOD	UNIT	SPECIFICATION	
			Min	Max
FREE SULPHUR	TE-LAB-PRO-08-0035 (SRUAN – 4 (KTI))	wt %	**99.9**	-
MOISTURE*	TE-LAB-PRO-08-0036 (SRUAN – 4 (KTI))	wt %	**0.05**	**3.0**
ASH	TE-LAB-PRO-08-0037 (SRUAN – 4 (KTI))	wt %	-	**0.01**
ACIDITY as H_2SO_4	TE-LAB-PRO-08-0039 (SRUAN – 4 (KTI))	wt %	**NIL**	-
ORGANIC MATTER	TE-LAB-PRO-08-0040 (SRUAN – 4 (KTI))	wt %	-	**0.01**
CHLORIDES as NaCl	TE-LAB-PRO-08-0041 (SRUAN – 4 (KTI))	wt %	**NIL**	-
COLOR	TE-LAB-PRO-08-0043 (SRUAN – 4 (KTI))	VISUAL	**Bright Yellow**	-
BULK DENSITY (Loose)	TE-LAB-PRO-08-0045	Kg/m^3	**1040**	-
H2S	TE-LAB-PRO-08-0067 (SRUAN – 4 (KTI))	ppm wt	-	**40.0**
SIEVE ANALYSIS				
Retained on 6.3 mm	TE-LAB-PRO-08-0044	wt %	-	**< 5.0**
Pass thru 5.6 mm	TE-LAB-PRO-08-0044	wt %	**75**	-

Retained on 2.8 mm	TE-LAB-PRO-08-0044	wt %	**75**	**-**
Pass thru 1.0 mm	TE-LAB-PRO-08-0044	wt %	**-**	**< 2.0**
Pass thru 0.3 mm	TE-LAB-PRO-08-0044	wt %	**-**	**< 0.5**

(*) Moisture range for the Sulphur shipment

SAFE HANDLING AND STORAGE GUIDELINES

Sulphur when stored and handled in solid prilled form can create and generate some dust formation, which can lead to dust explosion and inhalation. Good industrial hygiene practices should always be followed and personnel's handling it should be knowledgeable and trained. Following are some of the guidelines and mitigation measures which should be considered:

Storage guidelines:

- Storages or buildings housing any equipment in which Sulphur is handled or processed should be constructed with fire resistant materials.
- Where practical, dust producing processes should be confined and isolated.
- Where possible, to prevent accumulation of dust, the design of the storages or buildings should be such and the structural members so sloped and assembled or protected as to present the least possible surface (other than floor) on which the dust can lodge.
- Floor drains or troughs or gutters should be provided to carry off water from any area where cleaning is accomplished by flushing with hose streams.
- It is recommended that during the design stage and operating phase every effort be made to minimize the possibility of rusty metal components scraping or striking objects that may cause sparking inside the storages or buildings during normal operations and/or failure, collapsing or falling situations.
- Metal surfaces of carbon steel, structural steel, hoppers, equipment, tools, etc. should be protected from iron oxide formation at all times by painting, covering or use of other types of metals where practical.
- All parts of any storage or building where Sulphur dust may be present or handled should have adequate explosion proof vents.
- Storage or building vents should be distributed as uniformly as possible to provide adequate ventilation consistent with good engineering practices.
- Smoking is not allowed in any storages or buildings in which Sulphur is handled or processed.

Handling, Ventilation & Dust control guidelines:

- All parts of the storage or building in which dust may be raised should be vented to the outside air.
- The design and installation of explosion proof vents should be assigned to a competent

person who is familiar with their operation and effectiveness.

- All interior bins handling Sulphur dust should be provided with facilities to prevent blowing or dust dispersion inside the storage or building due to the displacement of air during filling.
- Sulphur bins should be filled and emptied through dust tight spouts or chutes.
- Dust should not be allowed to accumulate in any part of any storage or building or structure. Dust should be carefully removed from the walls, floors, and machinery of the plant at regular intervals.
- Blowing down of any surface by compressed air or other gases in a confined space should not be allowed.
- Where floor drains or troughs or gutters are provided for the removal of dust, the dust may be washed down the drain, trough or gutter using water hoses. Where drains, troughs or gutters are not provided, the dust should be carefully collected and removed.
- Where there is a provision for the collection of dust by vacuum systems, the systems should be designed such that the buildup of static electricity is prevented. Non-conducting ducts or hoses should not be used unless effectively bonded.
- Vacuum cleaners or other electrical devices for cleaning are required to be certified for use in the appropriate class and electrical code standards.

Equipment & Electrical Maintenance guidelines:

- Before any repair or maintenance work including any welding, burning, and cutting is undertaken on any machinery or equipment, the area within which it is to be undertaken plus an additional space of 2 meters all around, should first be carefully cleaned so that there is no Sulphur dust present. If impractical, other acceptable prevention measures should be taken, i.e., covering, wetting, steam blanketing, etc.
- On completion of any burning, cutting, or welding, the surrounding area should be carefully examined to ensure that no residual fragments or particles of burned or heated materials are left.
- Electrical power tools or any other piece of electrical equipment are required to be approved for use according to the appropriate class and electrical code standards.
- Relative humidity should be maintained as high as practical inside enclosed area where dust is expected to be in suspension.
- The electrical installation and electrical equipment are required to be constructed and installed in accordance with regulations adopted under the provisions of the Safety.
- Portable battery powered devices are required to be approved for use in the appropriate hazardous area.
- Where practical, conveyor belts should be of a type that are both fire resistant and anti-static. Provision for static discharge devices should be installed where it is impractical to use such type of conveyor belts.
- V-belts that drive machinery in an enclosed area should be fire resistant and anti-static.
- Oils used in enclosed areas for hydraulic circuits should be of fire-resistant grade. Similar oils should also be used for any traction purposes, where practical.
- Gasoline and diesel-powered equipment should not be used in enclosed hazardous

areas without special precautions such as a hot work permit.

ENVIRONMENTAL INFORMATION:

Sulfur is not classified as an environmental hazard as no specific hazards have been found to be associated with it. Aquatic toxicity is unlikely for Sulfur since it is not volatile and has low/negligible solubility in water. For additional details please consult the Safety Data Sheet (SDS) and Product Stewardship Summary (PSS).

REGULATORY INFORMATION:

Regulations exist that govern the manufacture, sale, transportation, use and/or disposal of products of the sulfur category. These regulations may vary by city, state, country or geographic region. Additional helpful information may be found by consulting the relevant product Safety Data Sheet.

SOURCES OF ADDITIONAL INFORMATION:

- Qatar Chemical Company Limited Material Safety Data Sheet Information http://www.qchem.com.qa/internet/Products/Pages/sulphur.aspx
- U.S. Environmental Protection Agency (USEPA) Hazardous Substances Data Bank (HSDB) http://toxnet.nlm.nih.gov/
- European Chemical Substances Information System (ESIS) http://esis.jrc.ec.europa.eu/
- The National Institute for Occupational Safety and Health (NIOSH) https://www.cdc.gov/niosh/

CONCLUSION:

Sulfur is an inorganic substance in the form of yellow solid prill, granules or pellet widely used in the applications for various industrial or consumer settings. As sold by Qatar Chemical Company Limited (Q-Chem), in solid prilled form, sulfur is chemically stable under normal ambient temperature and pressure. It is relatively non-toxic to humans, causing only mild or no irritation to skin and eyes. It is not toxic to aquatic and terrestrial organisms. However, make sure to consult the Safety Data Sheet and review applicable OSHA and other appropriate regulatory guidelines prior to use of these products.

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