Product Stewardship Summary
Sulfides, Disulfides, and Polysulfides Products

The product stewardship summary is intended to give general information about the chemical or categories of chemicals addressed. It is not intended to provide an in-depth discussion of all health and safety information. Additional information is available through the applicable Safety Data Sheet (SDS) which should be consulted before use of any chemical. This product stewardship summary does not supplant or replace required regulatory and/or legal communication documents.

Chemical Identity

The Sulfides, Disulfides, and Polysulfides Products are comprised of three classes of organosulfur compounds: sulfides, disulfides and polysulfides. There are currently 13 products in this group, and they are listed below based on their chemical class.

Sulfides
- Dimethyl Sulfide (DMS)
- Dimethyl Sulfide, Pure
- Diethyl Sulfide (DES)
- Di-*n*-Butyl Sulfide (DNBS)
- Ethyl *n*-Octyl Sulfide (ENOS)
- Methyl Ethyl Sulfide (MES)
- *n*-Dodecyl Methyl Sulfide (DDMS)
- Sulfur Calibration Standard

Disulfides
- Dimethyl Disulfide (DMDS)

Polysulfides
- Di-tert-Butyl Polysulfide (TBPS 454)
- Di-tert-Dodecyl Polysulfide (TDPS 320)
- Di-tert-Dodecyl Polysulfide (TDPS 532)
- Di-tert-Nonyl Polysulfide (TNPS 537)

Category Justification

Overall, the products within each class of compounds have similar physical and chemical characteristics and exhibit similar health and environmental hazards and environmental fates.

Product Uses

These products are generally used as agricultural intermediates, sulfiding agents, refinery catalysts, lubricant additives, calibration standards, gas odorants, and processing aids in mining applications. They are commercially available to industrial customers only, which typically include distributors, agricultural and chemical manufacturers.

Physical/Chemical Properties

Several products in this group are combustible or flammable liquids: these include dimethyl sulfide, diethyl sulfide, methyl ethyl sulfide, and dimethyl disulfide. They have the potential to cause fires if they are exposed to an ignitable source. The formation of hazardous combustible or decomposition byproducts, such as sulfur and carbon oxides, is possible. However, these products are typically stable under normal ambient and anticipated storage and handling

conditions of temperature and pressure. These products should be kept in a tightly sealed container, and stored in a cool and well-ventilated place, away from ignitable sources such as heat, sparks, open flames or hot surfaces.

Health Information

These products are expected to have low acute toxicity in humans, with the exception of dimethyl disulfide which has moderate-to-high toxicity when ingested and inhaled. Prolonged exposure to high vapor concentrations of these products may cause respiratory irritation, central nervous system (CNS) effects, including dizziness, headache, nausea, and loss of coordination. Due to their low odor thresholds, prolonged inhalation exposure is not expected to occur frequently; however, continuous exposures to some of these compounds may increase olfactory thresholds (i.e., decrease sense of smell). If ingested, some of these products may cause an aspiration hazard, which can result in severe pulmonary damage (e.g., pneumonitis or inflammation) or may be fatal. Dermal and eye contact with dimethyl disulfide, methyl ethyl sulfide can cause irritation; and the potential for skin sensitization (an allergic skin reaction) may be possible with dermal contact with n-dodecyl methyl sulfide, dimethyl disulfide, and TBPS 454. Repeated exposure of laboratory animals to TBPS 454 resulted in effects on the red blood cell, causing anemia at oral doses that are not likely to occur in humans from the anticipated use of the product. Data are unavailable to adequately characterize their potential to cause cancer in humans; however, genetic toxicity data were generally negative for the products tested, which is suggestive of a low potential to cause cancer. Available data show little to no evidence for their potential to cause reproductive, teratogenic or developmental toxicity effects.

Environmental Information

The environmental hazard potential for these products is varied, ranging from low to high. Some of these products may cause acute and chronic toxicity to aquatic life, with effects ranging from harmful to highly toxic. Overall, the available data suggest that the polysulfides products, with the exception of dimethyl sulfide, are not readily biodegradable (will persist in the environment); and their bioaccumulation potential is expected to be low. Due to the potential for some of these products to cause significant harm to aquatic environments, care should be taken to avoid releases of them to sewage, drainage systems and water bodies. Spillage should be quickly collected and properly disposed of to minimize harm to the environment.

Exposure Potential

The most likely routes of exposure to the Sulfides, Disulfides, and Polysulfides Products are skin and eye contact, and inhalation exposures. The best way to prevent exposure is to work in well-ventilated areas, wear appropriate personal protective equipment (PPE), and follow good personal hygiene practices.

Workplace Use:

Potentially exposed populations include: (1) workers who manufacture these products; (2) quality assurance workers who sample and analyze the products to ensure that they meet specifications; (3) workers involved in distribution and storage of these products; and (4) commercial consumers, in occupational settings, that use these products in intended applications. The probability of exposure to workers is expected to be low because these products are manufactured in enclosed, controlled environments, and are transported in tightly sealed containers. Due to their low odor thresholds, leaks can be detected quickly, and prolonged exposures can be avoided. These products are sold to industrial customers that are familiar with their intended applications, safe handling, storage, and disposal requirements.

Manufacturing, quality assurance, and transportation workers should always adhere to safe handling practices and wear appropriate personal protective equipment (PPE). Additionally, they have access to exposure prevention measures (e.g., engineering controls). Customers should also use appropriate PPE during handling and have risk mitigation measures in place to address potential physical hazards or accidental releases.

Consumer Use:
Potential exposure or impact to the general public is not anticipated for these products, as they are sold by Chevron Phillips Chemical Company to sophisticated industry users and not to the general population. The potential for odor complaints from the public is possible if a large scale spill or significant release occurred near a residential setting.

Potential Environmental Release:
There may be some potential for significant exposure to the environment from accidental releases during transportation of drums, truck trailers, rail cars, or container ships; however, the frequency of distribution incidents involving accidental release of these products has been low, and reported volumes spilled have been minimal. Chevron Phillips Chemical Company is committed to operating in an environmentally responsible manner and participates in the American Chemistry Council's Responsible Care® program.

Risk Management

Chevron Phillips Chemical Company is committed to Product Stewardship and doing business responsibly. We endeavor to provide sufficient information for the safe use and handling of all our products. We make product information available to all of our customers, distributors, carriers, and users of these products which contain detail about the properties of each product. To that end, a Safety Data Sheet and a certificate of analysis accompany each shipment from our manufacturing plant.

Before using these products, the user is advised and cautioned to make its own determination and assessment of the safety and suitability of the product for the specific use in question. It is the ultimate responsibility of the user to ensure suitability for use and determine if this information is applicable to the user's specific application. Chevron Phillips Chemical Company does not make, and expressly disclaims, all warranties, including warranties of merchantability or fitness for a particular purpose, regardless of whether oral or written, express or implied, or allegedly arising from any usage of any trade or from any course of dealing in connection with the use of the information contained herein or any product itself. The user expressly assumes all risk and liability, whether based in contract, tort or otherwise, in connection with the use of the information contained herein or any product itself.

Regulatory Information

Regulations exist that govern the manufacture, sale, transportation, use, and disposal of these products. These regulations may vary by city, state, country or geographic region. Additional relevant information may be found by consulting the applicable SDS.

Sources of Additional Information

Safety Data Sheets (SDS) at http://www.cpchem.com.

European Chemical Agency (ECHA) Dissemination portal with information on chemical substances registered under REACH.

- https://echa.europa.eu/information-on-chemicals/registered-substances

Conclusion

The Sulfides, Disulfides, and Polysulfides Products are classified as a hazardous chemical. Efforts should be taken to minimize exposure to these products by adhering to safe-handling procedures, designated applications and uses, appropriate personal-protective equipment practices, and appropriate labeling, storage, and transportation procedures and requirements. The relevant SDS and applicable regulatory guidelines and requirements, including but not limited to Occupational Health and Safety Administration (OSHA) guidelines, should be consulted prior to the use or handling of these products.

Contact Information:

http://www.cpchem.com/

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