



Product Stewardship Summary C₂-C₄ Organosulfur Products

This 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 products in the C₂-C₄ Organosulfur group are low molecular weight compounds with a carbon number of C₂ through C₄. They are colorless liquids with a strong repulsive or pungent odor. This Product Line is comprised of pure substances or mixtures containing two or more of the pure substances from the following three classes of low molecular weight organosulfur compounds: 1) Mercaptans, which include: Ethyl Mercaptan, n-Propyl Mercaptan, Isopropyl Mercaptan, n-Butyl Mercaptan, Tertiary Butyl Mercaptan, and sec-Butyl Mercaptan; 2) Sulfides, which include: Dimethyl Sulfide; and Methyl Ethyl Sulfide; and 3) Tetrahydrothiophene. The 25 products included in the C₂-C₄ Organosulfur Group are listed below.

- Ethyl Mercaptan
- Isopropyl Mercaptan
- *n*-Propyl Mercaptan
- *n*-Butyl Mercaptan
- *s*-Butyl Mercaptan
- *t*-Butyl Mercaptan
- Scentinel® A
- Scentinel® E
- Scentinel® F-20
- Scentinel® F-25
- Scentinel® F-35
- Scentinel® F-40
- Scentinel® F-50
- Scentinel® N
- Scentinel® N-4
- Scentinel® O-10
- Scentinel® P
- Scentinel® PT
- Scentinel® S-20
- Scentinel® S-35
- Scentinel® S-40
- Scentinel® S-50
- Scentinel® T
- Scentinel® T-50
- Scentinel® TB

Category Justification

Overall, these products have similar physical and chemical characteristics. They are low molecular weight with moderate to high volatility, vapor pressure, and flammability characteristics, but are not reactive products. In general, the products within this group exhibit similar health and environmental hazards, with varying severity of effects.

Product Uses

The C₂-C₄ Organosulfur products are typically used as agricultural, chemical, and pharmaceutical intermediates and natural gas odorants. Products in this group are commercially available to industrial customers only, which typically include agricultural and chemical manufacturers, pharmaceutical, and utility companies.

Physical/Chemical Properties

The C₂-C₄ Organosulfur products are highly flammable liquids and have a high 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 storage and handling conditions (ambient 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

Overall, the C₂-C₄ Organosulfur products may cause low acute toxicity effects in humans, primarily affecting the skin and eyes. Dermal contact with some of these products may cause skin sensitization (an allergic skin reaction), and varying degrees of irritation, ranging from slightly irritating to severe irritating. Acute effects on the eye may include mild to severe irritation. Prolonged exposure to high vapor concentrations 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. These products exhibit a low potential for chronic toxicity effects in humans; however, the kidney, liver, and blood (red blood cells) have been noted as potential target organs in repeated high dose inhalation and oral animal toxicity studies. Data are currently unavailable to characterize the potential of these products to cause cancer in humans. However, genetic toxicity data were negative for these products, suggesting that they have a low potential to cause cancer. Additionally, available data suggest that these products are unlikely to result in reproductive or developmental toxicity.

Environmental Information

The environmental hazard potential for the C₂-C₄ Organosulfur products is high. These products may cause acute and chronic toxicity to aquatic life, with effects ranging from harmful to highly toxic. Some of these products may persist in the environment (i.e., they are not expected to be readily biodegradable). However, their low octanol-water partition coefficients (log K_{ow}) indicate that they have a low potential to accumulate in aquatic life. Due to the potential of these products to cause significant harm to aquatic environments, care should be taken to avoid releases of these products to sewage, drainage systems, and water bodies. Spillage shall be quickly collected in the event of an accidental release.

Exposure Potential

The most likely routes of exposure to the C₂-C₄ Organosulfur 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) quality assurance workers who sample and analyze the products to ensure that they meet specifications; (2) workers involved in distribution and storage of these products; and (3) commercial consumers in occupational settings that use these products in intended applications. The most likely routes of exposure to these products in an occupational setting are eye and dermal contact, and potentially inhalation exposure. However, the likelihood of exposure to workers is expected to be low because these products are packaged in enclosed, controlled environments (i.e. drumming), transported in well-sealed containers, and because workers in the manufacturing and/or quality lab settings are properly trained to handle such products and wear appropriate personal protective equipment (PPE). Additionally, due to their low odor thresholds, product leaks can typically be detected quickly, and prolonged exposures can be avoided. Further, these products are sold to sophisticated industrial customers that are familiar with the intended applications, safe handling, storage, and disposal requirements. Packaging and loading, quality assurance, and transportation workers should always adhere to safe-handling practices, wear appropriate PPE and practice applicable exposure prevention measures (i.e. engineering controls). Customers should 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 releases during transportation or elsewhere are significant.

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 C₂-C₄ Organosulfur 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: <http://echa.europa.eu/information-on-chemicals>

OECD-SIDS Screening Information Data Set (SIAR) for C₂-C₄ Aliphatic Thiols (2010). Available at: http://webnet.oecd.org/Hpv/UI/SIDS_Details.aspx?id=2E26FC10-2C03-4588-8DE6-B1B3A4DDC496

Conclusion

C₂-C₄ Organosulfur products are classified as hazardous chemicals. 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/](http://www.cpchem.com)