Product stewardship summary: Diphenylamines

Introduction

At Chevron Oronite, we foster a culture grounded in operational excellence and are committed to protecting people and the environment. This product stewardship summary is one example of that commitment.

For engines to perform their everyday functions as well as expected, all their moving parts must be powered and protected with fuels and lubricants enhanced by some of the most technologically advanced additives. The products we produce help fuels and lubricants push the boundaries of speed, strength, cleanliness, and durability.

Oxidation is a common process occurring under engine operating conditions by which lubricating oil is degraded into a variety of undesired oxidation products. Antioxidants are a class of chemicals that inhibit formation of such products. By controlling oxidation, antioxidants prevent oil breakdown and thickening resulting in longer lasting and smoother engine operations. Diphenylamine (DPA) is known for its ability to interact with free radicals generated during oxidation and prevent further oxidative decomposition of the lubricating oil.

Figure 1 below shows some of the common problems that occur following oxidation of oil and the resulting formation of a variety of products that cause corrosion of engine parts, accelerated wear, and sludge and deposit formation.

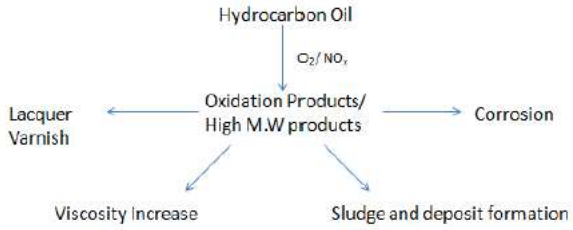

Figure 1. Common problems associated with oxidation of Hydrocarbon Oil.

Description and Properties

Alkylated DPAs are viscous, brown, oily liquids readily soluble in oil and lighter weight hydrocarbons. Alkylated DPAs have little or no solubility in water and because they are lighter than water, will float in a water environment. Figure 2 below illustrates a generic structure of diphenylamines.

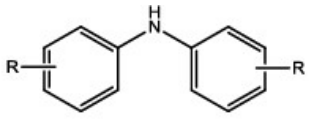

Figure 2: Generic structure of dpa

Health Information

This summary is based on information as of June 2020

Studies of DPA antioxidants by the dermal and oral routes of exposure indicate that these substances are relatively low in acute toxicity. Due to their low vapor pressure, inhalation toxicity is not expected to be an issue. Signs of systemic toxicity occur in test animals only at very high dose levels that are much greater than typical human exposure.

Studies indicate that some DPA antioxidants may cause skin irritation but are not known to be skin sensitizers. These chemicals are not expected to cause prolonged or significant eye irritation nor reproductive and developmental toxicity.

Studies demonstrate that these substances have low potential to be toxic to genetic material in cells and do not present a significant risk for mutagenicity or carcinogenicity in humans.

Environmental Information

Based on test data, DPA antioxidants are not readily biodegradable and may cause long-term adverse effects in the aquatic environment. DPA antioxidants are not acutely toxic to aquatic organisms. These substances are not expected to inhibit wastewater treatment plant microorganisms at typical discharge rates.

In the event of a spill of a product containing DPA antioxidants, stop the source of the release if it can be done safely. Refer to Safety Data Sheet for spill response and clean-up procedures. Report spills to local authorities. For USA, call National Response Center at 1-800-424-8802.

Regulatory Information

Requirements may exist that govern the manufacture, importation, sale, transportation, use and/or disposal of DPA antioxidants or products containing them. These requirements may vary by jurisdiction. For more information, consult the Safety Data Sheet.

Exposure Potential

The low volatility and low water solubility of DPA antioxidants limit the potential for exposure. Indirect exposure to these chemicals via the environment is likely to be negligible.

Manufacturing of DPA generally occurs in dedicated closed systems with proper engineering controls, thereby minimizing exposure. Solid waste is either incinerated or recycled. Therefore, there is no significant release to the environment. Wastewater is treated before it is released. Workers in manufacturing plants, including those who conduct sample analysis, blending, maintenance and cleaning are well trained in their operations and wear appropriate personal protection equipment. Professional mechanics, service station attendants and other skilled workers wear personal protective equipment and use hygiene practices that reduce exposure to the oil. Consumer exposure may occur while working around engines, but this is likely to be infrequent. In summary, there is minimal potential for exposure to DPA antioxidants to the consumer.

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