

Product stewardship summary: Polyisobutylene-based fuel additives



Introduction

At Chevron Oronite, we foster a culture grounded in operational excellence and are committed to protecting people and the environment. This product 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.

Polyisobutylene (PIB)-based deposit-control fuel additives are polymeric chemicals used as additives in engine fuel (such as gasoline) to keep sludge, soot, oxidation products and other deposit precursors from forming deposits on and harming key engine parts. These deposits can rob an engine of power, reduce fuel economy, and increase harmful emissions.

Description and Properties

A basic diagram of a PIB-based fuel additive is shown in Figure 1. The product consists of a long hydrocarbon tail to make the additive soluble in gasoline or other fuels or oils, and a polar head, usually a nitrogen containing compound called an amine. The amine will attract combustion and wear by-products, such as water, carbonaceous particulates, metals, or varnish, or preventing deposits formation on intake system parts or combustion chambers.

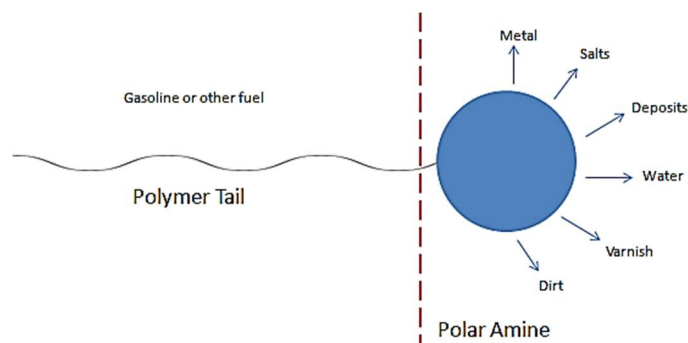


Figure 1. Diagram of a fuel additive in an engine environment.

These additives are typically prepared by starting with a polymer of polybutene, and then grafting on a polar function, such as an amine, by means of a polar linking group. In some cases, the polymer backbone may contain oxygen to improve the additive's effectiveness. Proper function of these additives is critical to keeping the injection systems clean, maximize engine fuel economy, prevent power loss and reduce emissions. Use of fuel containing a deposit-control additive is critical to helping to maintain engine performance over the life of your car.



Figure 2 Intake valve deposits before and after deposit control additive use.

Health Information

Studies of PIB-based fuel additives by the dermal and oral routes of exposure indicate that these substances are relatively low in acute toxicity. Signs of acute oral toxicity or acute dermal toxicity may occur only at very high dose levels much higher than human exposure from using PIB-based additives containing products. Studies indicate that PIB-based fuel additives can be skin sensitizers and may cause an allergic skin reaction and skin irritation. Ingestion of these chemicals may be irritating to mouth, throat, and stomach. Excessive or prolonged breathing may cause central nervous system effects including drowsiness or dizziness.

Environmental Information

Based on test data, PIB-based fuel additives are not expected to be readily biodegradable. Some PIB-based fuel additives may cause long-term adverse effects in the aquatic environment and long-lasting harmful effects to aquatic life. 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 PIB, 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 PIB-based fuel additives or products containing them. These requirements may vary by jurisdiction. For more information, consult the appropriate Safety Data Sheet.

Exposure Potential

Manufacturing of PIB-based fuel additives 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 PIB-based fuel additives to the consumer.

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