Product stewardship summary: viscosity modifiers

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.

The viscosity of any liquid is sensitive to temperature. As temperature increases, viscosity decreases (i.e., the liquid flows easier), and vice versa. Effects on viscosity may result in reduced performance for engines that have to operate at extreme temperatures. The change of viscosity of lubrication oil relative to temperature variation is called "viscosity index (VI)."

Description and Properties

Viscosity index improvers, or modifiers, are usually ethylene/propylene copolymers which are large molecules used in a wide range of products, including lubricant additives. They are white or light-colored solids at ambient temperature which can soften and flow upon heating. They have little to no solubility in water and because they are less dense than water, will float in an aquatic environment.

Upon dissolving in oil, viscosity modifiers adopt a coiled conformation. The size of the coil is dependent on the temperature. These coils can expand upon heating. A larger coil volume impedes the free movement of the oil, increasing the internal friction which causes an increase in viscosity.

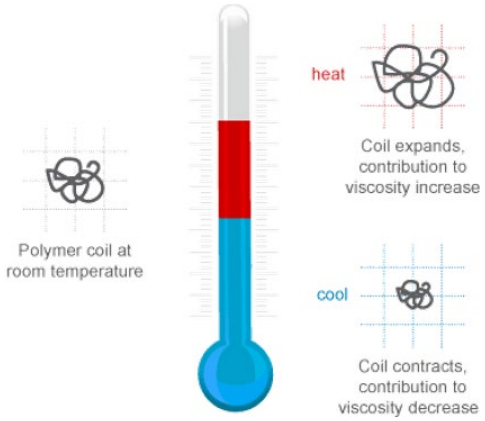

Figure 1. How a Viscosity modifier's structure changes with temperature.

At low temperatures, the molecule chain contracts and does not impact the fluid viscosity. The thickening impact on the oil's viscosity at high temperatures is therefore greater than the impact at low temperatures, leading to a difference that determines the viscosity index of a viscosity modifier.

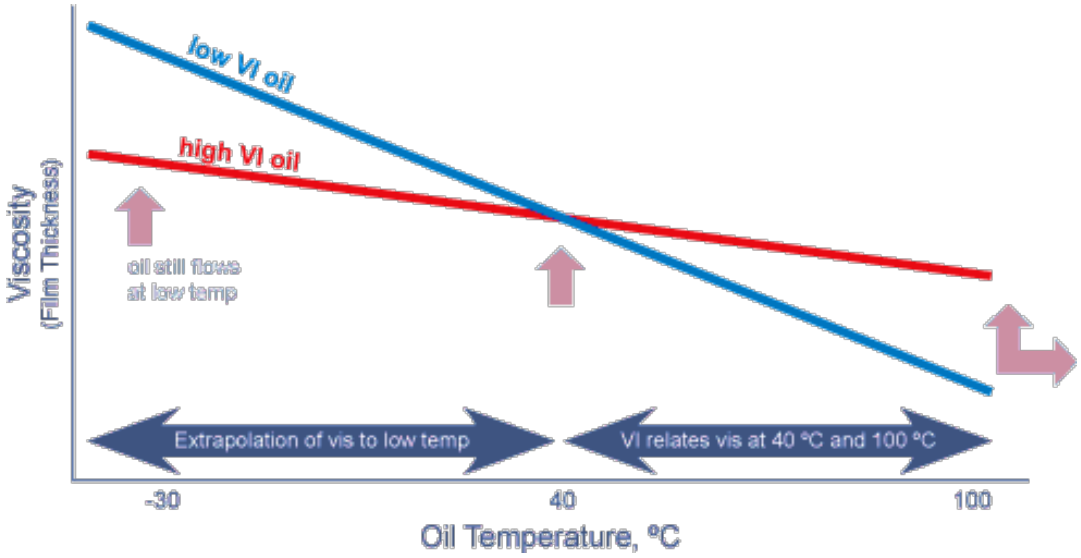

Figure 2. Oil viscosity vs. oil temperature.

Health Information

Exposure to viscosity modifiers is not expected to cause prolonged or significant eye irritation. If material is heated, thermal burns may result from eye contact. Eye contact with some viscosity modifiers may cause slight irritation but does not injure eye tissue.

Potential exposure to viscosity modifiers by dermal route may result in low toxicity as contact with the skin is not expected to cause an allergic skin response. However, repeated contact with viscosity modifiers may cause skin irritation. Viscosity modifiers are not expected to be harmful to internal organs if absorbed through the skin. If material is heated, thermal burns may result from skin contact. These chemicals are not expected to be harmful if swallowed.

The chemicals containing a petroleum-based mineral oil may cause respiratory irritation or other pulmonary effects following prolonged or repeated inhalation of oil mist at airborne levels above the recommended mineral oil mist exposure limit.

Solid polymers of viscosity modifiers are not expected to cause prolonged or significant skin irritation or eye irritation in normal industrial use. Exposure to hot materials may cause thermal burns and adhesion of the solidified products to the skin. Based on available data, there is low concern that viscosity modifiers can cause cancer.

Environmental Information

Viscosity modifiers are not expected to be harmful to aquatic organisms. They are expected to persist in the environment but have very low toxicity due to low bioavailability. Degradation of viscosity modifiers is primarily by ultraviolet light and only occurs when exposed sunlight. Since viscosity modifiers are not readily biodegradable, they are not expected to contaminate groundwater or produce harmful gases in a landfill. Since absorption is expected to be essentially non-existent, viscosity modifiers are not expected to bioaccumulate.

In the event of a spill of a product containing viscosity modifiers, 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 viscosity modifiers or products containing them. These requirements may vary by jurisdiction. For more information, consult the Safety Data Sheet.

Exposure Potential

Manufacturing of viscosity modifiers 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 viscosity modifiers to the consumer.

Responsible Care Contact Information

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