

INEOS Oligomers

Lubricants Summary

Traditionally, polybutenes have been used to improve the performance of automotive and industrial oils by virtue of their good thickening power and excellent shear stability. As health, safety and other environmental aspects of lubricants become increasingly important, polybutenes are a particularly good choice, since they exhibit very low deposit formation and low toxicity. Unlike conventional lubricants, polybutenes depolymerize cleanly when heated above about 250°C leaving little or no residue. Applications that can take advantage of these properties include low smoke/clean burning two-stroke oils, non-staining metal working lubricants, bearing lubricants, compressor lubricants, and low toxicity/energy efficient gear oils and greases.

Two-Stroke Fuels and Lubricants

Indopol polybutenes have been shown to be a cost-effective way of achieving low smoke performance in two-stroke engines, as well as bringing other significant benefits including clean burning, reduced corrosion and scoring, and the elimination of engine deposits. Consequently manufacturers of two-stroke engines are increasingly specifying formulations containing polybutene, especially as concern about air pollution continues to grow in countries with large motorcycle populations.

Polybutenes are now an integral component of two-stroke oils formulated to meet JASO and global performance specifications. These performance specifications seek to assure the modern image of the two-stroke engine and address the growing environmental pressure to reduce smoke emission from exhaust systems. They also aim to standardize the quality of lubricant available for use in engines, worldwide. The specifications cover oils used in motorcycles, scooters, chainsaws, snowmobiles and agricultural equipment.

Gear and Hydraulic Oils

The excellent shear stability, friction reduction (as evidenced by 4-ball wear tests) and high viscosity index of the higher molecular weight grades of Indopol are of particular benefit in the formulation of high quality, energy efficient gear and hydraulic oils. Unlike many high molecular weight polymers, Indopol polybutene is not degraded by high shear as tests have shown that Indopol grades from L-14 to H-18000 are as shear stable as any lubricant of comparable molecular weight.

Metalworking Lubricants

Polybutenes are widely used as lubricants for metalworking, including can making, automotive applications (cutting, stamping, etc.), hot or cold rolling, drawing and brazing, tube extrusion and rust prevention. The ability of polybutene to depolymerize at high temperature and the absence of sulfur and nitrogen containing species, helps to obtain a clean and unblemished surface finish to the metal. Unlike conventional oils, degreasing is not necessary prior to annealing, thereby helping to reduce processing costs.

Emulsions of Indopol polybutene (and Panalane hydrogenated polybutene) are also effective lubricants for non-ferrous metals. Typically, emulsions are preferred where large quantities of frictional heat must be removed. Polybutene emulsions do not need solvents for cleaning and therefore can help reduce VOC emissions. They can be formulated with biocides, corrosion inhibitors, coupling agents and demulsifiers to obtain the required performance characteristics. The inherent extreme pressure (EP) properties of polybutene emulsions make them particularly beneficial for working with aluminium. Since water and surfactants present in some emulsions may cause stains, individual applications may require evaluation of special surfactants if staining is a concern.

Lubricants containing Indopol polybutene (or polybutene emulsions) are used in several applications where incidental food contact can result, such as the production of aluminium and steel foils and cans. The chemical stability of Panalane hydrogenated polybutene makes it an ideal choice for applications that require a clean, non-oxidizing lubricant with low odor and no taste, such as food and beverage cans. For compliance status of specific Indopol and Panalane grades, refer to the Regulatory Information section of this website.

Soap-Based Gels/Greases

Indopol polybutenes can be converted to a gel by incorporating a metal soap such as aluminum stearate. Greases can be made using Indopol with calcium, lithium or aluminum soaps in a heated grease mixer, for use in plain and anti-friction bearings. Polybutenes control the consistency of the grease and, more importantly, provide protection against water wash-off. This is especially important in greases for heavy-duty construction equipment, chain drives and other applications requiring a grease that clings to metal and resists spin-off.

Compressor Oils

Indopol polybutenes are widely used either alone or in combination with other oils, as lubricants for the barrels of the compressors that are used to generate the high pressures of ethylene gas required in the manufacture of LDPE. Polybutenes help provide the necessary high pressure sealing, continuous film forming and oxidation resistance properties needed. They have limited volatility, and will fully meet typical requirements regarding high purity, low moisture content, low deposit formation and inertness, which are important parameters for these lubricants.

Oil & Fuel Additives

In engine oils, chemical derivatives of Indopol polybutenes are widely used as dispersants to control deposits and prevent oil thickening and sludge formation. These dispersant additives have environmental benefits, since they allow longer oil drain intervals and can improve fuel economy. They are amphiphilic molecules, wherein the hydrophobic polybutene "tail" is attached chemically to a hydrophilic "head group". An example of such a dispersant is polybutenyl succinimide. This is made by reacting polybutene with maleic anhydride to give polybutenyl succinic anhydride (PIBSA), which is then reacted with a polyamine to make the succinimide. PIBSA derivatives are also used as stabilizers in emulsion explosives for mining.

Polybutene-based fuel additives such as polybutenyl amines are widely used in gasoline engines to reduce deposit formation and to remove deposits already present in carburetors, fuel injectors and intake system, and on valves and pistons. They are also used in diesel fuel to help clean fuel injectors and hence improve fuel economy.

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