

Oxidation Stability of Biolubricants

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The growing importance of environmental awareness and regulations has led to new demands of lubricants based on biodegradable materials. The European Ecolabel for Lubricants was published in the Official Journal (26th April 2005). To apply this label, the products have to meet requirements for performance, show limited toxicity to aquatic organisms, have high biodegradability and low potential for bioaccumulation and contain a certain percentage of renewable sources.

In order to assess this performance, it is important to understand how oxidative degradation processes occur at biodegradable fluids and identify adequate control parameters, limits and sampling frequency.

Oxidation stability is a very important property for lubricants. The composition of the base oil plays a major role in oxidation processes and response to inhibitors. The inherent resistance to oxidation differs from one type of base stock to another due to differences in chemistry as well as processing and refining methods.

The mineral oil oxidation products are well known. The degradation mechanism of the mineral lubricants has been studied identifying the oxidation products by means of some analytical techniques.

Some studies of the oxidation mechanism of the vegetable oils reveal that the oxidation mechanism may be presented as a free radical chain reaction. It consists of four distinct reaction steps: initiation, propagation, branching and ending. These steps have been analyzed.

A new oxidation method has been developed and used instead of ASTM D 943, widely used to evaluate the oxidation stability of inhibited steam-turbine oils in the presence of oxygen, water, and copper and iron metals at 95°C and ASTM D 2274, to measure the inherent stability of middle distillate petroleum fuels under specified oxidizing conditions at 95°C.