

PALM ESTERS FOR LUBRICANT

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Natural oils and fats have been extensively used as lighting fuel or as lubricating oils and greases until the middle of 19th century. After that, mineral oil takes over. At present, about 90% of the lubricants use mineral oil as their base fluid. In the recent years, due to the pressure of environmental legislation and the demand for sustainable energy, has led to the growing interest for bio-based lubricants. It is estimated that the bio-based lubricant will grow 10% to 15% in the next five years in the European Union. Vegetable oil itself is an excellent lubricant. It has good load-carrying ability, a low coefficient of friction, a low evaporation rate, less flammable than mineral oil and the viscosity does not change much with temperature. Above all, it is inherently non-toxic and biodegradable. The disadvantages of vegetable oils are poor thermal, oxidation and hydrolytic stability. For these reasons, these oils may only be used in the less severe applications. However, these vegetable oils could be transformed chemically into better adapted molecules called *esters*. These oleochemical esters are molecules similar to natural oils, but possess a much better thermal, oxidative and hydrolytic stability as well a cold temperature fluidity without sacrificing much of its good properties as lubricant.

The bio-based lubricants have been used in areas like metalworking fluid, hydraulic oils, chainsaw oils for the forestry and construction industries, thermal fluids for radiators and cooling systems and even as one of the components in the synthetic engine oil. It has been reported that the use of bio-based lubricant poses less health problems to the operator, less detrimental to the environment and therefore save on the cost for cleaning up the environment.

Six types of palm esters have been developed using palm-based material. It could be used on its own as a base fluid to formulate a bio-based lubricant or



Figures 1. Palm esters for lubricant.

blended with other esters or even a mineral oil or synthetic oil to produce the desired lubricants. Some of the properties of the base oils are shown in Figures 1 and 2.

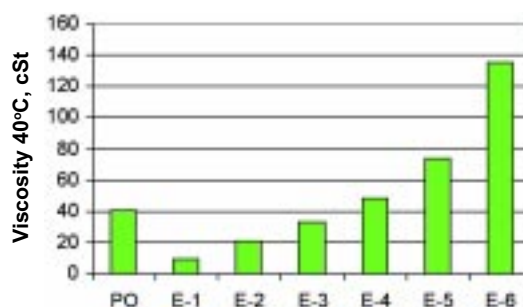


Figure 2. Viscosity of the palm esters.

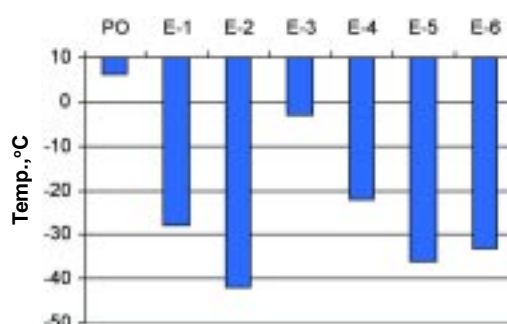


Figure 3. Pour point of the palm esters.



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