SYNTHESIS AND ANALYSIS OF PONGAMIA VEGETABLE OIL LUBRICANT FOR IC ENGINE APPLICATIONS

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The depletion of the world’s crude oil reserve, increasing crude oil prices, and issues related to conservation have brought about renewed interest in the use of bio-based materials. Emphasis on the development of renewable, biodegradable, and environmentally friendly lubricants has resulted in the widespread use of natural oils and fats. Vegetable oils are promising candidates as base fluid for eco-friendly lubricants because of their excellent lubricity, biodegradability, viscosity-temperature characteristics and low volatility. In view of agriculture based Indian economy, there is a great potential of producing vegetable oil based lubricants, which has ecological compatibility in addition to technical performance. However, suitability of the vegetable oils for a specific application either needs chemical modification or may be used as it is with additive blending route in order to get base stocks as per specifications for a particular end use application.

About 5 to 10 million tons of petroleum products enter the environment every year, with 40% of that representing spills, industrial and municipal waste, urban runoff, refinery processes, and condensation from marine engine exhaust. Thus, strict specifications on biodegradability, toxicity, occupational health and safety, and emissions have become mandatory in certain applications. Vegetable oils, a renewable resource, are finding their way into lubricants for industrial and transportation applications.

This study presents some of the tribological characteristics study of non-edible pongamia vegetable oil with different percentage of Zinc-Dialkyl-Dithio-Phosphale (ZDDP) additive. The additive is added to the base oil in different proportions, that is 1.5vol%, 2vol%, 2.5vol%, 3vol% and 3.5vol%, then the tribological characteristic such as viscosity is studied using canon-fenske viscometer. The wear and frictional force test are conducted by using 4 ball testing machine under a normal load of 147 N and variable rotating speed of 1140-1260 rpm. Wear and friction test results indicates that, at a particular concentration of 2wt% ZDDP is an effective anti-wear and anti-friction additive for pongamia oil.

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