

Exploratory Study to Obtain a Biolubricant Base from Transesterified Oils of Animal Fats (Tallow)

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Abstract : Due to the current need to implement environmentally friendly technologies, the possibility of using renewable raw materials to produce bioproducts such as biofuels, or in this case, to produce biolubricant bases, from residual oils (tallow), originating has been studied of the bovine industry. Therefore, it is hypothesized that through the study and control of the operating variables involved in the reverse transesterification method, a biolubricant base with high performance is obtained on a laboratory scale using animal fats from the bovine industry as raw materials, as an alternative for material recovery and environmental benefit. To implement this process, esterification of the crude tallow oil must be carried out in the first instance, which allows the acidity index to be decreased (> 1 mg KOH/g oil), this by means of an acid catalysis with sulfuric acid and methanol, molar ratio 7.5:1 methanol: tallow, 1.75% w/w catalyst at 60°C for 150 minutes. Once the conditioning has been completed, the biodiesel is continued to be obtained from the improved sebum, for which an experimental design for the transesterification method is implemented, thus evaluating the effects of the variables involved in the process such as the methanol molar ratio: improved sebum and catalyst percentage (KOH) over methyl ester content (% FAME). Finding that the highest percentage of FAME (92.5%) is given with a 7.5:1 methanol: improved tallow ratio and 0.75% catalyst at 60°C for 120 minutes. And although the % FAME of the biodiesel produced does not make it suitable for commercialization, it does ($> 90%$) for its use as a raw material in obtaining biolubricant bases. Finally, once the biodiesel is obtained, an experimental design is carried out to obtain biolubricant bases using the reverse transesterification method, which allows the study of the effects of the biodiesel: TMP (Trimethylolpropane) molar ratio and the percentage of catalyst on viscosity and yield as response variables. As a result, a biolubricant base is obtained that meets the requirements of ISO VG (Classification for industrial lubricants according to ASTM D 2422) 32 (viscosity and viscosity index) for commercial lubricant bases, using a 4:1 biodiesel molar ratio: TMP and 0.51% catalyst at 120°C, at a pressure of 50 mbar for 180 minutes. It is necessary to highlight that the product obtained consists of two phases, a liquid and a solid one, being the first object of study, and leaving the classification and possible application of the second one incognito. Therefore, it is recommended to carry out studies of the greater depth that allows characterizing both phases, as well as improving the method of obtaining by optimizing the variables involved in the process and thus achieving superior results.

Keywords : biolubricant base, bovine tallow, renewable resources, reverse transesterification

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