Reduction of free fatty acids in crude Jatropha curcas oil via an esterification process

ABSTRACT

An important consideration in the feedstock selection for biodiesel production is the content of free fatty acid (FFA) in the oil. In this project, the Jatropha curcas oil (JCO) was used as the feedstock for producing biodiesel. To be used as a feedstock, the JCO should contain a low pe rcentage of FFA so that the oil can directly be utilized in a transesterification reaction with methanol in the presence of an alkaline catalyst. Since, the free fatty acid contents in the JCO were found to vary from 2.5% to 65%, the FFA content in the oil was reduced via esterification of JCO with methanol and sulphuric acid as a catalyst. In this study, the effects of esterification parameters namely the time of reaction, temperature, catalyst-to-JCO ratio and methanol-to-JCO ratio on the final free fatty acid content of JCO were studied. The final FFA content of JCO was successfully lowered to 0.5% at 60°C under atmospheric pressure, using 1.0% of catalyst-to-JCO ratio, 60% w/w of methanol-to-JCO ratio, and 18 0 minutes of reaction time. Without prior removal of FFA, a large quantity of fatty soap was formed in the reaction and the entire products become gel-like materials. However, after using two-steps reaction consisting of the esterification followed by transesterification, the yield and quality of product are markedly enhanced.

Keyword: Free fatty acid; Transesterification; Jatropha curcas oil