Temperature dependence on the synthesis of jatropha biolubricant

ABSTRACT

Jatropha oil has good potential as the renewable energy as well as lubricant feedstock. The synthesis of jatropha biolubricant was performed by transesterification of jatropha methyl ester (JME) with trimethyl-ol-propane (TMP) with sodium methoxide (NaOCH3) catalyst. The effects of temperature on the synthesis were studied at a range between 120°C and 200°C with pressure kept at 10mbar. The conversion of JME to jatropha biolubricant was found to be the highest (47%) at 200°C. However, it was suggested that the optimum temperature of the reaction is at 150°C due to insignificant improvement in biolubricant production. To maintain forward reaction, the excess amount of JME was maintained at 3.9:1 ratios to TMP. Kinetic study was done and compared. The synthesis was found to follow a second order reaction with overall rate constant of 1.49 × 10ï 1 (%wt/wt.minfdgC)ī 1. The estimated activation energy was 3.94 kJ/mol. Pour point for jatropha biolubricant was at ī 3°C and Viscosity Index (VI) ranged from 178 to 183. The basic properties of jatropha biolubricant, pour point and viscosities are found comparable to other plant based biolubricant, namely palm oil and soybean based biolubricant.

Keyword: Transesterification; Jatropha curcas; Biodegradable lubricant