

Synthesis, Characterization and physical properties of Dimer Acid 2-Ethylhexyl Ester

Abstract

Dimer acid (C38) 2-ethylhexyl ester (DA2EH) is a potential candidate for bio-lubricant formulation. The DA2EH was synthesized in a concentrated sulfuric acid catalyzed esterification process of C38 dimer acid at a ratio of 1:20 excess alcohol. The mixture was heated to 120 °C for 72 h and neutralized with 1.2 eq KOH in 90% ethanol /water solution. Excess 2-ethylhexanol was removed via molecular distillation (wiped film evaporation). Reaction progress was monitored using ^{13}C NMR for percent conversion analysis. Two batches from dimer acid isolated from zeolite catalysts (JW2018C and JW2028C) showed 96.7% and 97.1% conversion respectively. Percent acid number against 1:1 toluene: propanol titrant and 0.01% phenolphthalein were 3.57 and 3.55 for batches 1 and 2 respectively. Quantitative NMR (^{13}C and ^1H) were previously used to structurally characterize the molecular structures of the precursor dimer acids which showed some degree of aromaticity and linear structures. Synthesized DA2EH is currently being evaluated for physico-chemical properties to provide a functional fluid. These include viscosity index, pour point, cloud point and oxidative stability index.