High oleic pentaerythritol tetraester formation via transesterification: Effect of reaction conditions

ABSTRACT

Pentaerythritol tetraoleate esters synthesized from high oleic palm oil methyl ester (POME) have potential as biolubricant base stock. In the present study, the chemical transesterification of POME and pentaerythritol (PE) using sodium methoxide as a catalyst was conducted under vacuum. The effect of operating variables such as reaction temperature, catalyst concentration, the molar ratio of POME to PE, vacuum pressure, and stirring rate on the yield of PE tetraoleate was examined. The ideal conditions for the reaction were at a temperature of 160 °C, 1.25% (w/w) catalyst concentration, the molar ratio of POME to PE at 4.5:1, vacuum pressure at 10 mbar, and stirring speed at 900 rpm. PE tetraoleate with a yield of 36% (w/w), was successfully synthesized under this condition within 2 h of reaction time.

Keyword: Transesterification; Pentaerythritol tetraester; Optimization; Biolubricant