ABSTRAK

SINTESIS BIOPELUMAS DARI MINYAK JELANTAH MENGGUNAKAN KATALIS ASAM FOSFAT

Minyak jelantah berpotensi dimanfaatkan sebagai bahan baku biopelumas yang ramah lingkungan dan dapat diperbarui. Penelitian ini bertujuan untuk menganalisis pengaruh konsentrasi katalis asam fosfat dan waktu reaksi terhadap karakteristik biopelumas, menentukan kondisi operasi terbaik, serta mengidentifikasi gugus fungsi produk menggunakan FTIR. Sintesis biopelumas dilakukan melalui proses esterifikasi dan transesterifikasi dengan variasi konsentrasi katalis asam fosfat 1–5% dan waktu reaksi 130–150 menit pada suhu 120°C. Karakteristik yang dianalisis meliputi rendemen, densitas, viskositas, titik nyala, dan titik tuang. Hasil penelitian menunjukkan bahwa peningkatan konsentrasi katalis dan waktu reaksi cenderung meningkatkan rendemen dan titik nyala. Kondisi operasi terbaik diperoleh pada konsentrasi katalis 2% dan waktu reaksi 140 menit dengan densitas 0,9560 g/mL, viskositas 13,09 cSt, titik nyala 377°C, titik tuang 1°C, dan rendemen 81%. Analisis FTIR menunjukkan terbentuknya gugus O–H, C=O ester, C–O, dan C–O–C yang mengindikasikan keberhasilan proses sintesis biopelumas dari minyak jelantah.

Kata kunci : asam fosfat, biopelumas, minyak jelantah,transesterifikasi

ABSTRACT

SYNTHESIS OF BIOLUBRICANTS FROM WASTE-COOKED OIL USING PHOSPHORIC ACID CATALYST

Waste cooking oil has the potential to be utilized as a renewable and environmentally friendly feedstock for biolubricant production. This study aimed to investigate the effects of phosphoric acid catalyst concentration and reaction time on the characteristics of biolubricants, determine the optimum operating conditions, and identify the functional groups of the resulting product using Fourier Transform Infrared (FTIR) spectroscopy. Biolubricants were synthesized through esterification and transesterification processes using phosphoric acid catalyst concentrations ranging from 1–5% and reaction times of 130–150 minutes at a reaction temperature of 120°C. The analyzed characteristics included yield, density, viscosity, flash point, and pour point. The results showed that increasing catalyst concentration and reaction time generally enhanced the yield and flash point of the biolubricants. The optimum operating condition was obtained at a catalyst concentration of 2% and a reaction time of 140 minutes, producing a biolubricant with a density of 0.9560 g/mL, viscosity of 13.09 cSt, flash point of 377°C, pour point of 1°C, and yield of 81%. FTIR analysis confirmed the presence of O–H, ester C=O, C–O, and C–O–C functional groups, indicating the successful synthesis of biolubricants from waste cooking oil.

Keywords : *biolubricant, phosphoric acid, transesterification, waste cooking oil*