

ABSTRAK

PENGARUH VARIASI KONSENTRASI KALSIMUM HIDROKSIDA DAN SUHU REAKSI SAPONIFIKASI TERHADAP KARAKTERISTIK PELUMAS PADAT (*GREASE*) BERBASIS MINYAK JELANTAH

Elsa Daryanti, 2026, 49 Halaman, 5 Tabel, 13 Gambar, 4 Lampiran

Penelitian ini bertujuan untuk mengetahui pengaruh variasi konsentrasi kalsium hidroksida ($\text{Ca}(\text{OH})_2$) dan suhu saponifikasi terhadap karakteristik bio-*grease* berbasis minyak jelantah serta menentukan kondisi terbaik yang memenuhi standar mutu. Bio-*grease* dibuat menggunakan minyak jelantah sebagai *base oil* dan minyak jarak sebagai bahan pembentuk *thickener*. Variasi konsentrasi $\text{Ca}(\text{OH})_2$ yang digunakan yaitu 25%, 30%, 35%, 40%, dan 45% dengan suhu saponifikasi 150°C dan 180°C. Karakteristik bio-*grease* dianalisis melalui pengujian densitas, viskositas, titik leleh, dan FTIR.

Hasil penelitian menunjukkan bahwa peningkatan konsentrasi $\text{Ca}(\text{OH})_2$ dan suhu saponifikasi meningkatkan densitas, viskositas, dan titik leleh bio-*grease*. Nilai densitas yang diperoleh berkisar 0,9118–0,9741 g/cm³, viskositas 47,92–347,36 cSt, dan titik leleh 83,73–84,87°C. Hasil analisis FTIR menunjukkan adanya gugus O–H, C–H, C=O, C–O, dan karboksilat (COO^-) yang mengindikasikan terbentuknya sabun kalsium sebagai *thickener*. Perlakuan terbaik diperoleh pada konsentrasi $\text{Ca}(\text{OH})_2$ 45% dan suhu saponifikasi 180°C dengan densitas 0,9741 g/cm³, viskositas 347,36 cSt, dan titik leleh 84,50°C. Hasil penelitian menunjukkan bahwa minyak jelantah berpotensi dimanfaatkan sebagai bahan baku bio-*grease* yang ramah lingkungan dan bernilai ekonomis.

Kata kunci: bio-*grease*, minyak jelantah, minyak jarak, kalsium hidroksida, saponifikasi.

ABSTRACT

THE EFFECT OF CALCIUM HYDROXIDE CONCENTRATION AND SAPONIFICATION TEMPERATURE ON THE CHARACTERISTICS OF WASTE COOKING OIL-BASED GREASE

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This study aimed to determine the effect of calcium hydroxide (Ca(OH)_2) concentration and saponification temperature on the characteristics of waste cooking oil-based bio-grease and to identify the optimum conditions that meet quality standards. Bio-grease was produced using waste cooking oil as the base oil and castor oil as the thickener-forming material. The concentrations of Ca(OH)_2 used were 25%, 30%, 35%, 40%, and 45%, with saponification temperatures of 150°C and 180°C. The characteristics of the bio-grease were evaluated through density, viscosity, melting point, and Fourier Transform Infrared Spectroscopy (FTIR) analyses.

The results showed that increasing the Ca(OH)_2 concentration and saponification temperature generally enhanced the density, viscosity, and melting point of the bio-grease. The density values ranged from 0.9118 to 0.9741 g/cm³, viscosity from 47.92 to 347.36 cSt, and melting point from 83.73 to 84.87°C. FTIR analysis revealed the presence of O–H, C–H, C=O, C–O, and carboxylate (COO^-) functional groups, indicating the formation of calcium soap as the thickening agent. The optimum treatment was obtained at a Ca(OH)_2 concentration of 45% and a saponification temperature of 180°C, resulting in a density of 0.9741 g/cm³, viscosity of 347.36 cSt, and a melting point of 84.50°C. These findings demonstrate that waste cooking oil has significant potential as an environmentally friendly and economically valuable raw material for bio-grease production.

Keywords: bio-grease, waste cooking oil, castor oil, calcium hydroxide, saponification.