

ABSTRAK

PENGARUH RASIO MOL METANOL PADA BIODIESEL BERBASIS MINYAK JELANTAH MENGGUNAKAN KATALIS ENZIM LIPASE TERIMOBILISASI DI *PACKED BED REACTOR*

**(Muhammad Rayhan Leonardi, 88 Halaman, 11 Tabel,
20 Gambar, 4 Lampiran)**

Biodiesel merupakan salah satu sumber energi terbarukan yang berpotensi mengurangi ketergantungan terhadap bahan bakar diesel berbasis minyak bumi. Dalam penelitian ini, minyak jelantah dimanfaatkan sebagai bahan baku biodiesel karena ketersediaannya yang melimpah, biaya yang relatif rendah, serta berpotensi mengurangi dampak pencemaran lingkungan. Proses produksi biodiesel dilakukan melalui proses *pre-treatment*, netralisasi, dan transesterifikasi menggunakan enzim lipase terimobilisasi pada matriks resin sebagai biokatalis dalam sistem *Packed Bed Reactor*. Dengan variasi rasio mol metanol berbanding minyak sebesar 1:3; 1:5; 1:7; 1:9; dan 1:11 serta penggunaan enzim lipase terimobilisasi sebanyak 10 gram dan 15 gram. Hasil Biodiesel terbaik diperoleh pada rasio mol 1:5 dan penggunaan enzim lipase sebanyak 10 gram, dengan densitas 873,24 kg/m³, viskositas 4,52 cSt, bilangan saponifikasi 128,66 mg-KOH/g, angka asam 0,46 mg-KOH/g, angka iodin 45,85 I₂/100g, gliserol total 0,20%, angka setana 65,8, titik nyala 180,4°C, *yield* 90,02%, dan kandungan metil ester sebesar 96,7%. Sebagian besar, hasil penelitian menunjukkan bahwa parameter biodiesel yang dihasilkan telah memenuhi persyaratan mutu berdasarkan SNI 7182:2015, namun pada data angka asam dan metil ester 2-3 data belum memenuhi standar dikarenakan kurang optimalnya proses reaksi dan konversi menjadi produk.

Kata Kunci: *Biodiesel, Minyak Jelantah, Transesterifikasi, Metanol, Enzim Lipase Terimobilisasi.*

ABSTRACT

EFFECT OF METHANOL MOLE RATIO ON BIODIESEL BASED ON WASTE COOKING OIL USING IMMOBILIZED LIPASE ENZYME CATALYST IN A PACKED BED REACTOR

***(Muhammad Rayhan Leonardi, 88 Pages, 11 Tabels, 20 Figures,
4 Attacment)***

Biodiesel is a renewable energy source that has the potential to reduce dependence on petroleum-based diesel fuel. In this study, used cooking oil was used as a biodiesel feedstock due to its abundant availability, relatively low cost, and potential to reduce environmental pollution. The biodiesel production process is carried out through pre-treatment, neutralization, and transesterification using immobilized lipase enzymes on a resin matrix as a biocatalyst in a Packed Bed Reactor system. With variations in the mole ratio of methanol to oil of 1:3; 1:5; 1:7; 1:9; and 1:11 and the use of immobilized lipase enzymes of 10 grams and 15 grams. The best biodiesel results were obtained at a mole ratio of 1:5 and the use of 10 grams of lipase enzyme, with a density of 873,24 kg/m³, viscosity of 4.52 cSt, saponification number of 128.66 mg-KOH/g, acid number of 0.46 mg-KOH/g, iodine value of 45,85 I₂/100g total glycerol of 0.20%, cetane number of 65.8, flash point of 180,4°C, yield of 90.02%, and methyl ester content of 96.7%. Overall, the results of the study indicate that the biodiesel produced has met the quality requirements based on SNI 7182:2015, For the most part, the research results show that the parameters of the biodiesel produced have met the quality requirements based on SNI 7182:2015, however, the acid number and methyl ester data 2-3 data have not met the standards due to the less than optimal reaction and conversion process into products.

Keywords: *Biodiesel, Waste Cooking Oil, Transesterification, Methanol, Amobile Lipase Enzyme.*