ABSTRAK

Pengaruh Persentase Katalis MgO dan Temperatur Terhadap Persen *Yield* dalam Pembuatan Biodiesel Berbasis Minyak Jelantah

(Adi Priyono, 2026: 41 Halaman,6 Tabel,12 Gambar)

Minyak jelantah merupakan limbah yang masih mengandung trigliserida sehingga berpotensi dimanfaatkan sebagai bahan baku biodiesel. Penggunaan katalis heterogen magnesium oksida (MgO) menjadi salah satu alternatif dalam proses transesterifikasi karena memiliki aktivitas katalitik yang baik, mudah dipisahkan, dan dapat digunakan kembali. Penelitian ini bertujuan untuk mengetahui pengaruh persentase katalis MgO dan temperatur reaksi terhadap *yield* dan karakteristik biodiesel yang dihasilkan dari minyak jelantah. Penelitian dilakukan menggunakan metode transesterifikasi dengan bahan baku 1 liter minyak jelantah dan 250 mL metanol. Variasi yang digunakan yaitu persentase katalis MgO sebesar 1% dan 2% terhadap berat minyak serta temperatur reaksi 50°C, 55°C, 60°C, 65°C, dan 70°C. Biodiesel yang dihasilkan kemudian diuji karakteristiknya meliputi *yield*, densitas, viskositas, titik nyala (*flash point*), dan nilai kalor (*Higher Heating Value/HHV*), kemudian dibandingkan dengan standar SNI 7182:2024. Hasil penelitian menunjukkan bahwa temperatur dan persentase katalis MgO berpengaruh terhadap *yield* dan sifat fisik biodiesel. *Yield* tertinggi diperoleh pada penggunaan katalis MgO 2% dengan temperatur 60°C, yaitu sebesar 84,0%. Nilai densitas biodiesel berada pada kisaran 868,08–891,46 kg/m³, viskositas 5,44–6,55 cSt, titik nyala 124–198,1°C, dan nilai kalor 10.696,1–10.796,1 cal/g. Sebagian besar karakteristik biodiesel telah memenuhi persyaratan SNI 7182:2024, meskipun beberapa sampel memiliki nilai viskositas dan densitas yang sedikit melebihi batas standar. Berdasarkan hasil penelitian, kondisi operasi yang paling optimum adalah penggunaan katalis MgO 2% pada temperatur 60°C, karena menghasilkan *yield* biodiesel tertinggi dengan karakteristik yang mendekati standar mutu.

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Kata Kunci : Biodiesel, Minyak Jelantah, Magnesium Oksida (MgO), Transesterifikasi, *Yield*, Temperatur

ABSTRACT

Effect of MgO Catalyst Concentration and Reaction Temperature on Biodiesel Yield from Waste Cooking Oil

(Adi Priyono, 2026: *41 Pages,6 Tables,12 Figures*)

Waste cooking oil is a potential renewable feedstock for biodiesel production due to its high triglyceride content. The use of magnesium oxide (MgO) as a heterogeneous catalyst offers several advantages, including high catalytic activity, easy separation from the reaction mixture, and catalyst reusability. This study aimed to investigate the effect of MgO catalyst concentration and reaction temperature on the yield and quality characteristics of biodiesel produced from waste cooking oil. The biodiesel was produced through a transesterification process using 1 L of waste cooking oil and 250 mL of methanol. The independent variables were MgO catalyst concentrations of 1 wt% and 2 wt% (based on the weight of the oil) and reaction temperatures of 50°C, 55°C, 60°C, 65°C, and 70°C. The produced biodiesel was evaluated in terms of yield, density, kinematic viscosity, flash point, and Higher Heating Value (HHV). The results were compared with the Indonesian National Standard (SNI 7182:2024) for biodiesel quality. The results showed that both reaction temperature and MgO catalyst concentration significantly affected the biodiesel yield and its physical properties. The highest biodiesel yield of 84.0% was achieved using 2 wt% MgO catalyst at 60°C. The density of the produced biodiesel ranged from 868.08 to 891.46 kg/m³, the kinematic viscosity ranged from 5.44 to 6.55 cSt, the flash point ranged from 124 to 198.1°C, and the Higher Heating Value (HHV) ranged from 10,696.1 to 10,796.1 cal/g. Most of the biodiesel properties complied with the requirements of SNI 7182:2024, although several samples exhibited density and viscosity values slightly above the specified limits. Based on the experimental results, the optimum operating condition was obtained using 2 wt% MgO catalyst at a reaction temperature of 60°C, producing the highest biodiesel yield with fuel properties close to the national quality standard.

Keywords : *Biodiesel, Waste Cooking Oil, Magnesium Oxide (MgO), Transesterification, Yield, Reaction Temperature.*