

ABSTRAK

Pengaruh Variasi Rasio Katalis CaO/TiO₂ terhadap Produksi Biodiesel Berbahan Baku *Crude Palm Oil* (CPO) Menggunakan *Baffled Stirred Tank Reactor*

(Zahra Aufa Rafiqi, 2026, 40 Halaman, 6 Tabel, 7 Gambar, 4 Lampiran)

Meningkatnya kebutuhan energi dan berkurangnya cadangan bahan bakar fosil mendorong pengembangan biodiesel sebagai sumber energi alternatif yang ramah lingkungan. Penelitian ini bertujuan mengkaji pengaruh rasio katalis CaO/TiO₂ dan kecepatan pengadukan terhadap yield dan karakteristik biodiesel dari *Crude Palm Oil* (CPO). Proses transesterifikasi dilakukan menggunakan *Baffled Stirred Tank Reactor* pada suhu 60°C, konsentrasi katalis 7%, dan rasio molar metanol 6:1. Hasil penelitian menunjukkan kondisi optimum diperoleh pada rasio katalis 2:1 dan kecepatan pengadukan 600 rpm dengan yield biodiesel sebesar 61,12%. Biodiesel yang dihasilkan memiliki densitas 0,85 g/ml, viskositas 4,83 cSt, titik nyala 168°C, angka setana 65, dan angka asam 0,303 mg KOH/g yang telah memenuhi SNI 7182:2015. Analisis XRD menunjukkan katalis didominasi oleh fase CaCO₃ dan anatase TiO₂.

Kata kunci: Biodiesel, *Crude Palm Oil* (CPO), CaO/TiO₂, Transesterifikasi, Yield

ABSTRACT

The Effect of Variations in the CaO/TiO₂ Catalyst Ratio on Biodiesel Production from Crude Palm Oil (CPO) Using a Baffled Stirred Tank Reactor

(Zahra Aufa Rafiqi, 2026, 40 Pages, 6 Tables, 7 Pictures, 4 Apendix)

The increasing energy demand and declining fossil fuel reserves have encouraged the development of biodiesel as an environmentally friendly alternative fuel. This study investigated the effect of CaO/TiO₂ catalyst ratio and stirring speed on the yield and characteristics of biodiesel produced from Crude Palm Oil (CPO). Transesterification was carried out in a Baffled Stirred Tank Reactor at 60°C using 7% catalyst and a methanol-to-oil molar ratio of 6:1. The optimum condition was obtained at a catalyst ratio of 2:1 and a stirring speed of 600 rpm, producing a biodiesel yield of 61.12%. The resulting biodiesel had a density of 0.85 g/ml, viscosity of 4.83 cSt, flash point of 168°C, cetane number of 65, and acid number of 0.303 mg KOH/g, all of which met the Indonesian National Standard (SNI 7182:2015). XRD analysis showed that the catalyst was predominantly composed of CaCO₃ and anatase TiO₂ phases.

Keywords: Biodiesel, Crude Palm Oil (CPO), CaO/TiO₂, Transesterification, Yield