

# Sintesis Biodiesel Melalui Reaksi Transesterifikasi dari Minyak Kelapa Sawit dan Lemak Ayam dengan Katalis Metal Organic Frameworks Berlogam Ca = Biodiesel Synthesis through Transesterification Reaction of Palm Oil and Chicken Fat using Metal Organic Frameworks Catalyst with Calcium

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## Abstrak

Biodiesel disintesis melalui reaksi transesterifikasi menggunakan material metal organic frameworks dengan logam Ca (Ca-MOF) sebagai katalis. Ca-MOF disintesis dengan metode hidrotermal pada suhu 110. Katalis Ca-MOF dikarakterisasi dengan FTIR, XRD, SEM dan SAA. Variasi pengujian transesterifikasi dilakukan berupa berat katalis (2%, 4% dan 6%), rasio bahan baku dan metanol (1:6, 1:8 dan 1:10) serta jenis bahan baku yang digunakan (minyak kelapa sawit dan lemak ayam). Sampel dengan konversi tertinggi yaitu 8,010% terdapat pada variasi bahan baku minyak kelapa sawit dengan katalis 6% serta rasio minyak dan metanol berjumlah 1:10. Sampel tersebut kemudian diuji dengan empat parameter SNI (densitas, viskositas, bilangan asam dan bilangan iodine) serta dianalisis dengan GC-MS. Hasilnya, sampel memenuhi 3 dari 4 parameter meliputi densitas, viskositas dan bilangan iodine. Sedangkan yield yang didapatkan sebesar 7,457%. Aktivasi katalis kemudian dilakukan pada 300, yang kemudian meningkatkan koversi sebesar 12,63%. Rendahnya konversi produk diperkirakan karena rusaknya luas permukaan katalis dikarenakan senyawa turunan N,N-dimetilformida (DMF).

.....Biodiesel is synthesized through transesterification reaction using metal-organic frameworks with calcium (Ca-MOF) as the catalyst. Ca-MOF is synthesized via a hydrothermal method at a temperature of 110. The Ca-MOF catalyst is characterized using FTIR, XRD, SEM, and SAA. Variations in transesterification testing are conducted by varying the catalyst weight (2%, 4%, and 6%), the feedstock-to-methanol ratio (1:6, 1:8, and 1:10), and the type of feedstock used (palm oil and chicken fat). The sample with the highest conversion, 8.010%, is obtained using palm oil as the feedstock, 6% catalyst, and a feedstock to-methanol ratio of 1:10. This sample is then tested for four SNI parameters (density, viscosity, acid number, and iodine number) and analyzed using GC-MS. The results show that the sample meets 3 out of 4 parameters, including density, viscosity, and iodine number, with a yield of 7.457%. Catalyst activation is then performed at 300, resulting in an increased conversion of 12.63%. The low conversion of the product is attributed to the damage to the catalyst surface area caused by N,N-dimethylformamide (DMF) derivative compounds.