

Nanokomposit nanoselulosa-SO₃H/CaO-La₂O₃ sebagai katalis bifungsional untuk produksi biodiesel dari Waste Cooking Oil (WCO) = Nanocellulose SO₃H/CaO La₂O₃ nanocomposite as a bifunctional catalyst for biodiesel production from Waste Cooking Oil (WCO)

Alia Huwaida Raharja, author

Deskripsi Lengkap: <https://lib.ui.ac.id/detail?id=20520666&lokasi=lokal>

Abstrak

Pada penelitian ini telah dilakukan sintesis nanokomposit nanoselulosa-SO₃H/CaO-La₂O₃ yang diaplikasikan sebagai katalis bifungsional untuk reaksi transesterifikasi waste cooking oil (WCO) menjadi biodiesel. Sintesis katalis menunjukkan keberhasilan yang didukung dengan karakterisasi FTIR, XRD, BET, SEM, TEM dan TGA. Presentase produk optimum sebesar 84,13% diperoleh menggunakan katalis nanokomposit nanoselulosa-SO₃H/CaO-La₂O₃ dengan rasio molar CaO terhadap La₂O₃ 5:1, rasio massa nanoselulosa-SO₃H terhadap CaO-La₂O₃ 2:1 dengan jumlah katalis yang digunakan 3%, waktu reaksi 120 menit, dan rasio molar iopolym : minyak sebesar 9:1. Kandungan asam lemak biodiesel hasil sintesis dianalisa menggunakan GC-MS, yang dan produk utamanya adalah senyawa iopo oleat dan iopo palmitat. Sifat fisik biodiesel hasil sintesis sesuai dengan standar SNI dan ASTM, dengan massa jenis (40 oC) 0,8706 g/mL, Asam lemak bebas (FFA) 0,381%, dan bilangan asam 0,757 mg KOH/g. Studi kinetika menunjukkan bahwa reaksi transesterifikasi WCO menjadi biodiesel menggunakan katalis nanoselulosa-SO₃H/CaO-La₂O₃ mengikuti pseudoorde-pertama, dengan konstanta laju reaksi 0.017 minit⁻¹

.....H/CaO-La₂O₃ nanocomposites were synthesized as bifunctional catalysts for the transesterification reaction of waste cooking oil (WCO) to biodiesel. The catalyst synthesis showed success which was supported by the characterization of FTIR, XRD, BET, SEM, TEM and TGA. The optimum biodiesel yield of 84.13% was obtained using a nanocellulose-SO₃H/CaO-La₂O₃ nanocomposite catalyst with a molar ratio of CaO to La₂O₃, 5:1, a mass ratio of nanocellulose-SO₃H to CaO-La₂O₃ (2:1) with a catalyst amount of 3% , a reaction time of 120 minutes, and a molar ratio of methanol: oil, 9:1. The fatty acid content of the synthesized biodiesel was analyzed using GC-MS, which showed that the main product are methyl oleate and methyl palmitate compounds. The physical properties of the synthesized biodiesel were in accordance with the SNI and ASTM standards, with a density (40oC) 0.8706 g/mL, free fatty acids (FFA) 0.381%, and acid number of 0.757 mg KOH/g. The kinetics study showed that the transesterification reaction of WCO into biodiesel using a nanocellulose- SO₃H/CaO-La₂O₃ catalyst followed a pseudo-first order, with a reaction rate constant of 0.017 min¹.