



Document details

< Back to results | 1 of 12 Next >

↗ Export ↴ Download 🖨 Print ✉ E-mail 📄 Save to PDF ☆ Add to List More... >

View at Publisher

Renewable Energy
Volume 155, August 2020, Pages 267-277

Biodiesel production from waste cooking oil using calcium oxide/nanocrystal cellulose/polyvinyl alcohol catalyst in a packed bed reactor (Article)

Zik, N.A.F.A., Sulaiman, S. ✉, Jamal, P. 👤

Department of Biotechnology Engineering, Faculty of Engineering, International Islamic University Malaysia, P.O BOX 10. 50728, Kuala Lumpur, Malaysia

Abstract

✓ View references (48)

In this study, biodiesel was synthesized from a reaction of waste cooking oil (WCO) and methanol in the presence of catalyst which was derived from chicken bone and coconut residue in a packed bed reactor. Calcium oxide (CaO) was extracted from calcined chicken bone and nano-crystal cellulose (NCC) was isolated from coconut residue by acid hydrolyzed and were supported with polyvinyl alcohol (PVA). The catalyst was analyzed using Fourier transform infrared (FTIR), Field emission scanning electron microscopy (FESEM), Thermogravimetric analysis (TGA) and X-ray diffraction (XRD) to study its elemental composition and surface morphology. The parameters used for the reaction were optimized by Design of Experiment (DOE) using Central Composite Design (CCD) to maximize the biodiesel yield. The maximum yield of 98.40% was obtained at optimum temperature, methanol to oil and catalyst loading of 65 °C, 6:1 and 0.5 wt%, respectively. Investigation on the kinetic of the reaction specified that the reaction followed pseudo first order reaction with k-value ranged from 0.0092 min⁻¹ to 0.0151 cm⁻¹ and Thiele modulus was less than 2. The activation energy E_a for the transesterification reaction was 45.72 kJ/mol. © 2020 Elsevier Ltd

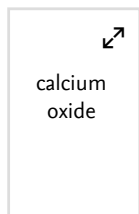
SciVal Topic Prominence ⓘ

Topic: Biodiesel | Transesterification | Produce biodiesel

Prominence percentile: 99.859 ⓘ

Chemistry database information ⓘ

Substances



Author keywords

Biodiesel production Chicken bone Heterogeneous catalyst Nano-catalyst Nano-cellulose Packed bed reactor

Indexed keywords

Metrics ⓘ View all metrics >



PlumX Metrics

Usage, Captures, Mentions, Social Media and Citations beyond Scopus.

Cited by 0 documents

Inform me when this document is cited in Scopus:

Set citation alert >

Set citation feed >

Related documents

Thermally produced nano catalyst for biodiesel production: A Review

Zik, N.A.F.A. , Sulaiman, S. , Jamal, P.
(2018) *Journal of Advanced Research in Fluid Mechanics and Thermal Sciences*

Development of CaO/PVA catalyst from fish bone for biodiesel production

Sulaiman, S. , Jamaludin, N.F.A. , Kabbashi, N.A.
(2019) *Bulletin of Chemical Reaction Engineering & Catalysis*

Synthesis, characterization, and optimization of Schizochytrium biodiesel production using Na⁺-doped nanohydroxyapatite

Kowthaman, C.N. , Varadappan, A.M.S.
(2019) *International Journal of Energy Research*

View all related documents based on references

Find more related documents in Scopus based on:

Authors > Keywords >




Engineering controlled terms:	Activation energy	Animals	Biodiesel	Calcium oxide	Catalysts	Cellulose
	Chemical reactors	Design of experiments	Field emission microscopes			
	Fourier transform infrared spectroscopy	Lime	Methanol	Morphology	Packed beds	
	Scanning electron microscopy	Surface morphology	Synthetic fuels			
	Thermogravimetric analysis					
Engineering uncontrolled terms	Biodiesel production	Central composite designs	Elemental compositions			
	Field emission scanning electron microscopy	Fourier transform infrared				
	Poly (vinyl alcohol) (PVA)	Pseudo-first order reactions	Transesterification reaction			
Engineering main heading:	Oils and fats					
GEOBASE Subject Index:	activation energy	biofuel	catalyst	cellulose	chemical reaction	detection method
	essential oil	inorganic compound	polymer	temperature effect		
PaperChem Variable:	Activation Energy	Animals	Calcium Oxide	Catalysts	Cellulose	Chemical Reactors
	Gravimetry	Thermal Analysis				

ISSN: 09601481
Source Type: Journal
Original language: English

DOI: 10.1016/j.renene.2020.03.144
Document Type: Article
Publisher: Elsevier Ltd

References (48)

[View in search results format >](#)

☐ All [Export](#)  Print  E-mail  Save to PDF [Create bibliography](#)

- ☐ 1 Alsharifi, M., Znad, H., Hena, S., Ang, M.
Biodiesel production from canola oil using novel Li/TiO₂ as a heterogeneous catalyst prepared via impregnation method

(2017) *Renewable Energy*, Part B 114, pp. 1077-1089. Cited 20 times.
<http://www.journals.elsevier.com/ezproxy.um.edu.my/renewable-and-sustainable-energy-reviews/>
doi: 10.1016/j.renene.2017.07.117

[View at Publisher](#)

- ☐ 2 Demirbas, A.
Progress and recent trends in biodiesel fuels

(2009) *Energy Conversion and Management*, 50 (1), pp. 14-34. Cited 1205 times.
doi: 10.1016/j.enconman.2008.09.001

[View at Publisher](#)

- ☐ 3 Ban, J., Arellano, J.L., Alawami, A., Aguilera, R.F., Tallet, M.
World Oil Outlook
(2016) . Cited 26 times.
Organization of the Petroleum Exporting Countries