



Ultrasound Assisted Dispersion of Magnesium Oxide on CeMCM-41 Nanocatalyst for Biodiesel Production from Waste Vegetable Oil

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Abstract:

In this study, Mobil Composite Material No. 41 (MCM-41) used as the catalyst support for biodiesel production from waste cooking oil. Also, Si/Ce molar ratio of 10 introduced to the MCM-41 structure to prepare a modified bifunctional nanocatalyst with high stability and acidity. Then, ultrasound irradiation used to disperse MgO as active phase on the surface of as-fabricated support. The synthesized nanocatalysts were investigated using various techniques as follows: XRD, TEM, FESEM, and BET. The XRD patterns along with the results of BET analysis revealed the MCM-41 framework destruction while introducing Ce into the lattice. The particle size and size distribution of the nanocatalyst with Si/Ce=10 were subsequently determined by TEM and FESEM images. Biodiesel production carried out under following operational parameters to evaluate the catalytic performance of synthesized samples: $T=70^{\circ}\text{C}$, catalyst loading=5 wt. %, methanol/oil molar ratio=9, and 6 h reaction time. Ce substitution in the support framework considerably enhanced the biodiesel conversion. The nanocatalyst with Si/Ce=10 demonstrated the extraordinary conversion of 94.3% compared to the nanocatalyst without Ce with 9.1% conversion. The reusability of the nanocatalyst with Si/Ce=10 studied during seven reaction cycles and biodiesel conversion reached to 88.7% at the end of the last cycle which demonstrates its significant stability.

Biography:

Sahar Dehghani is Ph.D. of Chemical engineering from Sahand University of Technology in May 2019. She got M.Sc. degree of Chemical engineering in the field of catalysis from the Razi University in Feb. 2012. Also, she got her B.Sc. degree in chemical engineering from Mohaghegh Ardabili in Feb. 2008. She had taught the lab course of "Chemistry (I)" at Sahand University of Technology for three terms. She has been working in the Reactor and Catalysis Research Center (RCRC) at Sahand University of Technology since 21 Sep. 2013 under supervision of Professor Mohammad Haghghi. Her research focuses on biodiesel production by heterogeneous catalysts in both M.Sc. and Ph.D.



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Frontiers in Catalysis and Chemical Engineering, Amsterdam, March 23-24, 2020

Citation: Sahar Dehghani ; Ultrasound Assisted Dispersion of Magnesium Oxide on CeMCM-41 Nanocatalyst for Biodiesel Production from Waste Vegetable Oil; Euro Catalysis 2020; March 23, 2020; Amsterdam, Netherlands.