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Green Catalyst from Natural Eggshell for Biodiesel Production

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High active, reusable solid catalyst was obtained from eggshell by a simple heat treatment method. Calcined eggshell was used in the transesterification of vegetable oil with methanol to produce biodiesel. In order to explain the effect of calcination temperature, we investigated the calcination process of eggshell with thermal gravity analysis (TGA), X-ray diffraction (XRD) pattern, Fourier transform infrared spectroscopy (FTIR), and Scanning Electron Microscopy (SEM) analysis.

The yield of biodiesel was affected by reaction variables, such as methanol/oil ratio, catalyst amount and reaction time. For the following reactions, all the catalyst was prepared by calcinning eggshell at 800 °C for 2 h. The produced biodiesel was characterized by techniques such as Fourier transform infrared (FTIR) spectroscopy, and nuclear magnetic resonance (NMR) spectroscopy. The experimental results showed that the yield increase with increasing the methanol/oil molar ratio, and reached a maximum when the ratio was above 9 and 3% of catalyst.

The method of reusing eggshell waste to prepare catalyst could recycle the waste, minimizing contaminants, reducing the cost of catalyst, and making the catalyst environmentally friendly. This high efficient and low-cost eggshell catalyst could make the process of biodiesel production economic and fully ecologically friendly.

Keywords: Eggshell waste; Biodiesel; Catalysis; Transesterification, Heterogeneous catalysis.

Biography:

Kaoutar KARA received the master's degree in Surface Hydrology and Water Quality from Sidi Mohamed Ben Abdellah University of Science and Technology, Fez, Morocco. She is currently a PhD student at the Laboratory of Mechanics and Industrial Processes. Chemical Sciences Research Team. Mohammed V University, Rabat, Morocco. Her research interests are in waste fish valorization, biodiesel production and green energy.