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Economical biodiesel fuel synthesis from castor oil using mussel shell-base catalyst (MS-BC)

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Abstract

This paper presents economical biodiesel fuel synthesis from castor oil using mussel shell-base catalyst (MS-BC). A transesterification of castor oil as non-edible feedstock to biodiesel was conducted in a flask reactor. Two catalysts were examined, where the calcined mussel shell and the impregnated calcium oxide with the potassium hydroxide were run by batch system. The catalysts and formed biodiesel were characterized and analyzed by Scanning Electron Microscopy (SEM), X-Ray Diffraction (XRD), Brunauer-Emmett-Teller (BET), Thermal Gravimetric Analysis (TGA), X-Ray Fluorescence (XRF) and Gas Chromatography (GC). The highest biodiesel yield (91.17%) was found by the catalyst loading of 2 wt/wt%, time of 3 h, temperature of 60°C and methanol oil ratio of 6:1. The impregnated catalyst provided magnificent results compared non-impregnated performance, and the reusable catalyst can be considered for beneficial biodiesel fuel synthesis.

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Keywords: Mussel shell, impregnated catalyst, transesterification, castor oil, economical biodiesel

1. Introduction

Development of bioenergy, like biodiesel as alternative fuel, environmental friendly, biodegradable properties has been becoming interesting issues. The biodiesel can be produced from edible, non-edible

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