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OPTIMIZATION OF TRANSESTERIFICATION PARAMETERS FOR OPTIMAL BIODIESEL YIELD FROM CRUDE JATROPHA OIL USING A NEWLY SYNTHESIZED SEASHELL CATALYST

A. N. R. REDDY[1,*], A. A. SALEH[1], M. S. ISLAM[2], S. HAMDAN[1]

[1]Department of Mechanical Engineering, Universiti Malaysia Sarawak, Malaysia
[2]Department of Chemistry, Bangladesh Army University of Engineering & Technology, Qadirabad Cantonment, Natore-6431, Bangladesh
*Corresponding Author: amarnadha@gmail.com

Abstract

Heterogeneous catalysts are promising catalysts for optimal biodiesel yield from transesterification of vegetable oils. In this work calcium oxide (CaO) heterogeneous catalyst was synthesized from *Polymedosa erosa* seashell. Calcination was carried out at 900ºC for 2h and characterized using Fourier transform infrared spectroscopy. Catalytic efficiency of CaO was testified in transesterification of crude Jatropha oil (CJO). A response surface methodology (RSM) based on five-level-two-factor central composite design (CCD) was employed to optimize two critical transesterification parameters catalyst concentration to pretreated CJO (0.01-0.03 w/w %) and the reaction time (90 min - 150 min). A JB yield of 96.48% was estimated at 0.023 w/w% catalyst and 125.76 min reaction using response optimizer. The legitimacy of the predicted model was verified through the experiments. The validation experiments conformed a yield of JB 96.4%±0.01% as optimal at 0.023 w/w% catalyst to pretreated oil ratio and 126 min reaction time.

Keywords: Biodiesel, Jatropha, Transesterification, Heterogeneous catalyst, Seashell.

1. Introduction

In recent years, depletion of the world's petroleum reserves and impact of environmental pollution caused by extensive combustion of fossil fuels, have gained importance in search of a substantial alternative energy resources such as biodiesel [1,2]. Biodiesel is a green energy resource, comprises mono alkyl ester of long fatty acids derived from biologically produced oils or fats including vegetable oils, animal fats and microalgae oils [3]. Many researchers have reported that bio-