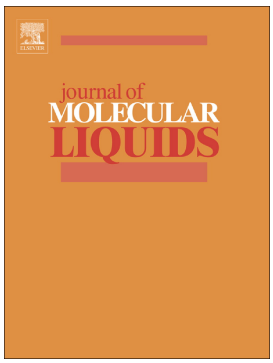

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PII: S0167-7322(17)33983-1
DOI: doi:10.1016/j.molliq.2017.11.053
Reference: MOLLIQ 8169

To appear in: *Journal of Molecular Liquids*

Received date: 29 August 2017
Revised date: 3 November 2017
Accepted date: 7 November 2017

Please cite this article as: Anjuman Shaheen, Shazia Sultana, Houfang Lu, Mushtaq Ahmad, Maliha Asma, Tariq Mahmood , Assessing the potential of different nano-composite (MgO, Al2O3-CaO and TiO2) for efficient conversion of Silybum eburneum seed oil to liquid biodiesel. The address for the corresponding author was captured as affiliation for all authors. Please check if appropriate. Molliq(2017), doi:10.1016/j.molliq.2017.11.053

Assessing the Potential of Different Nano- composite (MgO, Al_2O_3-CaO and TiO_2) for Efficient Conversion of *Silybum eburneum* Seed Oil to Liquid Biodiesel

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Abstract

This study investigated the potential of nano-composite MgO, Al_2O_3-CaO and TiO_2 for efficient conversion of novel non edible seed oil of *Silybum eburneum* into liquid biodiesel. *Silybum eburneum* contains oil contents (37.7%) and low free fatty acid (FAA) value (0.16 mg KOH/g). The synthesized heterogeneous nano- catalysts were characterized using X-Ray Diffraction (XRD), Fourier Transform Infrared Spectroscopy (FT-IR), Energy Dispersive X-Ray Spectroscopy (EDX) and Scanning Electron Microscopy (SEM) techniques. The highest conversion efficiency was achieved (91 % biodiesel yield) using MgO catalyst followed by Al_2O_3-CaO and TiO_2 at 0.1% catalysts loading. The optimized experimental variables comprised of molar ratio (1:3), temperature (70 ^{o}C), reaction time (3hrs.) and stirring rate (600 rpm) using reflux transesterification route. The XRD analysis showed the sizes of the crystal lattices with a sequence of 13nm for MgO, 29 nm for Al_2O_3-CaO and 37nm for TiO_2 which reveals that smaller the size of the crystal structure, higher will be the conversion efficiency. The SEM of MgO showed exclusively porous lamellar like smooth surface highly agglomerated with nano entities with a particle size of 50±10 nm length or width and about 20 nm thickness.SEM images of Al_2O_3-CaO nano-particles showed the size range from 27 nm to 75nm having irregular morphology including spherical as well as rod shape with smooth surface and different size. The