World Academy of Science, Engineering and Technology
International Journal of Energy and Environmental Engineering
Vol:17, No:03, 2023

Supercritical Methanol for Biodiesel Production from Jatropha Oil in the Presence of Heterogeneous Catalysts

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Abstract : The lanthanum and zinc oxide were synthesized and then loaded with 6 wt% over γ-Al_2O_3 using the wet impregnation method. The samples were calcined at 900 °C to ensure a coherent structure with high catalytic performance. Characterization of the catalysts was verified by X-ray diffraction (XRD) and Fourier-transform infrared spectroscopy (FT-IR). The effect of catalysts on biodiesel content from jatropha oil was studied under supercritical conditions. The results showed that ZnO/γ-Al_2O_3 was the superior catalyst for jatropha oil with 98.05% biodiesel under reaction conditions of 7 min reaction time, 1:40 oil to methanol molar ratio, 6 wt% of catalyst loading, 90 bar of reaction pressure, and 300 °C of reaction temperature, compared to 95.50% with La_2O_3/γ-Al_2O_3 at the same parameters. For this study, ZnO/γ-Al_2O_3 was the most suitable catalyst due to performance and cost considerations.

Keywords : biodiesel, heterogeneous catalyst, jatropha oil, supercritical methanol, transesterification
Conference Title : ICBB 2023 : International Conference on Biofuels and Bioenergy
Conference Location : Rome, Italy
Conference Dates : March 06-07, 2023

Open Science Index, Energy and Environmental Engineering Vol:17, No:03, 2023 publications.waset.org/abstracts/162036/pdf