World Academy of Science, Engineering and Technology
International Journal of Energy and Environmental Engineering
Vol:9, No:12, 2015

Glycerol-Free Biodiesel Synthesis from Crude Mahua (Madhuca indica) Oil under Supercritical Methyl Acetate Using CO2 as a Co-Solvent

Authors : Antaram Sarve, Mahesh Varma, Shriram Sonawane

Abstract : Conventional route of producing biodiesel with alcohol produces glycerol as side product which leads to oversupply and devaluation in the world market. Supercritical methyl acetate (SCMA) has been proven to convert triglycerides into fatty acid methyl esters (FAMEs) and triacetin, which is a valuable biodiesel additive as side product rather than glycerol. However, due to the low reactivity of supercritical methyl acetate on triglycerides, high reaction conditions are required to obtained maximum yields. The present study describes the renewable approach for the production of biodiesel from low-cost, high acid value mahua oil under supercritical methyl acetate condition using carbon dioxide (CO2) as a co-solvent. CO2 was employed to decrease high reaction conditions required for supercritical methyl acetate transesterification. The influence of process parameters such as temperature, oil to methyl acetate molar ratio, reaction time, and the CO2 pressure was evaluated. The properties of biodiesel produced were found to be superior compared to conventional biodiesel method. Furthermore, SCMA has a high tolerance towards free fatty acids (FFAs) which is crucial to allow the utilization of inexpensive waste oils as a biodiesel feedstock.

Keywords : supercritical methyl acetate, CO2, biodiesel, fuel properties
Conference Title : ICBB 2015 : International Conference on Biofuels and Bioenergy
Conference Location : Paris, France
Conference Dates : December 30-31, 2015