

ABSTRACT

Quick lime was calcined to produce calcium oxide (CaO) and it was used as solid catalyst for the transesterification between refined palm oil and methanol. The physical and chemical properties of catalyst were characterized by X-Ray diffraction (XRD), Scanning electron microscopy (SEM), Brunauer-Emmett-Teller (BET) and Hammelt indicators. The results from characterization showed that CaO was successfully prepared from quick lime. In the investigation of CaO catalyst activity for transesterification reaction, a response surface methodology (RSM) was carried out by application of 5-level-3-factors central composite design in order to study the effect of different variable factors on the percentage of fatty acid methyl ester (FAME) conversion that determined by proton-nuclear magnetic resonance ($^1\text{H-NMR}$) spectrometer. The result revealed that a quadratic model obtained from RSM can be used to predict reasonable precise outcome. In addition, the optimum conditions obtained from RSM were 6.32 wt% of catalyst concentration, 14.12:1 of methanol-to-oil molar ratio and 214 min of reaction time. Under these conditions, the produced biodiesel met well with the standard biodiesel requirement.

Key words: Quick lime, Transesterification, Response surface methodology , Refined oil Biodiesel