Synthesis of biodiesel by transesterification reaction of used palm oil using modified calcium oxide doped strontium ion as a catalyst

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Abstract: In this research studied, the modified calcium oxide catalyst doped strontium ion (3%-50% wt.) for used in transesterification reaction of used palm oil with methanol. The modified catalyst was synthesized by co-precipitation method between SrCl₂ and Ca(NO₃)₂ solution then calcined the mixture at 900 °C for 5 h to form a calcium doped strontium oxide catalyst. The characterizations were including Thermo-gravimetric analysis (TGA), X-ray diffraction (XRD), Scanning electron microscope (SEM), and Fourier transform infrared spectrometer (FT-IR). The result of SEM-EDX confirmed the morphology and elements content of Sr and Ca in the catalyst (prepared; 10.00:0.30 Ca:Sr catalyst found; Ca:Sr = 10.00:0.33 ). The approximate catalyst diameter is about 12.6±5.906 µm. The results show the highest conversion with 100% (the reaction time 3 h, catalyst loading 5% w/w, methanol to oil molar ratio 9:1 and reaction temperature 80 °C when used 3% Sr-CaO as a catalyst). The reusability of catalyst was studied and the results show six-time repeat reactions with a good yield (over 80%).

Keywords: Biodiesel production; Modified calcium oxide; Strontium ion doped catalyst; Transesterification