

Issara Singsat 2011: Biodiesel Production from Crude Palm Oil using CaO/SrO/ZnO Catalyst. Master of Engineering (Chemical Engineering), Major Field: Chemical Engineering, Department of Chemical Engineering. Thesis Advisor: Assistant Professor Kandis Sudsakorn, Ph.D. 148 pages.

Biodiesel production via transesterification reaction generally utilizes homogeneous base catalysts. However, such process results in both environmental and separation problems. Transesterification of crude palm oil with methanol over mixed oxides of Ca, Sr and Zn has been investigated batchwise. The CaO/SrO/ZnO catalyst was prepared via a conventional coprecipitation of the corresponding mixed metal nitrate solution and calcined at 1,000 °C for 5 h. Influences of catalyst amount, methanol/oil molar ratio, reaction time and reaction temperature were studied including the effects of different reusing methods of the spent catalyst and catalyst stability. Under the suitable transesterification conditions at 65 °C, 18:1 methanol-to-oil molar ratio, 5 wt% of catalyst amount and 2 h of reaction time, the high methyl ester content of 99.8% could be achieved. Analysis on the properties of the synthesized biodiesel was found to comply well with the standard set by the Department of Energy Business. The catalyst recovered by filtration, washing with cyclohexane and drying at 110 °C overnight (12 h) was found to be the best reusing method. The stability test was carried out by repeatedly using the catalyst up to 4 cycles. It was found that the catalyst was significantly deactivated in the fourth run yielding the methyl ester contents in the runs # 1-4 as 100%, 99.5%, 94.4% and 7.3%, respectively.

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Thesis Advisor's signature