

Phansiri Soodjit 2014: Synthesis of Biodiesel Catalyzed by Rare Earth Solid Catalyst. Master of Engineering (Advanced and Sustainable Environmental Engineering), Major Field: Advanced and Sustainable Environmental Engineering, Faculty of Engineering. Thesis Advisor: Associate Professor Penjit Srinophakun, Ph.D. 81 pages.

Rare earths obtained from decomposition of monazite ore by alkali process were used to synthesize the solid catalyst for a biodiesel production. In this work, the pure rare earth oxide catalysts such as  $\text{La}_2\text{O}_3$ ,  $\text{CeO}_2$  and  $\text{Nd}_2\text{O}_3$  were prepared by a precipitation method. They were used to catalyze the transesterification of palm oil with methanol. The catalysts were characterized by X-ray powder diffraction (XRD), Nitrogen adsorption isotherm (BET) and Scanning electron microscope (SEM). The  $\text{La}_2\text{O}_3$  was found to be the best catalyst with highest FAME content of 90.25%.

The optimization of reaction parameters was carried out with this active catalyst temperature (120-200 °C), catalyst loading (4-10 %wt) and molar ratio of oil to methanol (1:10-1:30). Under the condition namely catalyst loading 10 %wt, molar ratio of oil to methanol of 1:30, reaction temperature of 200°C, reaction pressure of 39 bar and stirring rate at 600 rpm, the highest rate of reaction was achieved. The FAME content of 94.85 % was obtained at 45 min. Besides, the prepared  $\text{La}_2\text{O}_3$  catalyst showed high reaction rate over that of commercial catalyst. The higher crystalline size of prepared  $\text{La}_2\text{O}_3$  catalyst causes the fast rate reaction.

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