

Biodiesel production from waste cooking oil using solid catalysts manufactured from waste scallop shells

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Biodiesel is a biodegradable, carbon-neutral and eco-friendly fuel, and produced via transesterification of lipids with methanol. Due to the increase in the price of feedstock of biodiesel, various cheap and sustainable feedstock has been extensively explored. Homogeneous chemical catalysts such as sodium hydroxide and sulfuric acid have been conventionally used, but they cannot be reused and generate a large amount of wastewater. In this study, WCO and waste scallop shells (WSSs) were used as the feedstock of biodiesel and source material of solid catalyst, respectively. Free fatty acid content of WCO used in this study is 1.86%, and calcium oxide(CaO) accounts for 98.4% of the solid catalyst manufactured through calcination of WSSs. Among the reaction factors, catalyst concentration exhibited the most significant influence. The optimal conditions of biodiesel production were 0.35% of catalyst concentration, 0.03 mL methanol/g-WCO, 60 °C and 3 hr of reaction time. Under these conditions, 80.1% of biodiesel conversion was obtained. Finally, the solid catalysts were reused and no significant decrease in biodiesel conversion was observed until the third round of biodiesel production.