Synthesis of aluminum chloride hexahydrate/polyvinyl alcohol catalyst for biodiesel production

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ABSTRACT
The replacement of traditional diesel fuels with an alternative energy source like biodiesel is an excellent choice to lessen the depletion of non-renewable energy source such as fossil fuels. For application of low-cost heterogeneous catalyst for generation of biodiesel, most of waste-based catalysts are derived from inexpensive CaO resources. In this research, heterogeneous catalyst aluminum chloride hexahydrate (AlCl36H2O)/PVA was synthesized from aluminum foil wastes supported by PVA. Transesterification was used to produce biodiesel from waste cooking oil (WCO). The effect of aluminum chloride hexahydrate (AlCl36H2O)/PVA catalyst towards the yield percentage of FAME was investigated using three different operating conditions. Parameters optimized in transesterification included methanol to oil ratio (6:1, 12:1 and 18:1), reaction temperature (55°, 60°, and 65°), and amount of catalyst (2 wt%, 5 wt%, and 8 wt%). The findings showed that the catalyst loading of 2 wt%, methanol to oil molar ratio of 6:1, and temperature of 55° yielded the highest biodiesel yield from WCO. This study proves that heterogeneous catalyst aluminum chloride hexahydrate (AlCl36H2O)/PVA can replace homogeneous catalysts and to simplify the manufacturing of biodiesel, especially in the separation phase.

KEYWORDS
Aluminium foil; Aluminum chloride hexahydrate/polyvinyl alcohol; Biodiesel; Heterogeneous catalyst; Waste cooking oil

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