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Biodiesel production from waste cooking oil over sulfonated catalysts

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ABSTRACT

Biodiesel production from waste cooking oil with methanol was carried out in the presence of poly(vinyl alcohol) with sulfonic acid groups (PVA-SO_3H) and polystyrene with sulfonic acid groups (PS-SO_3H), at 60°C. The PVA-SO_3H catalyst showed higher catalytic activity than the PS-SO_3H one. In order to optimize the reaction conditions, different parameters were studied. An increase of waste cooking oil conversion into fatty acid methyl esters with the amount of PVA-SO_3H was observed. When the transesterification and esterification of WCO was carried out with ethanol over PVA-SO_3H, at 60°C, a decrease of biodiesel production was also observed. The WCO conversion into fatty acid ethyl ester increased when the temperature was increased from 60 to 80°C. When different amounts of free fatty acids were added to the reaction mixture, a slight increase on the conversion was observed. The PVA-SO_3H catalyst was reused and recycled with negligible loss in the activity.

KEYWORDS

Biodiesel; heterogeneous catalysts; sulfonic acid groups; waste cooking oil