

The synthesis of sulphonated hypercrosslinked exchange resin for free fatty acid esterification

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ABSTRACT

Esterification has been extensively used as a pretreatment process in biodiesel production to reduce the free fatty acid (FFA) content in the feedstock. This study investigates the potential of sulphonated hypercrosslinked exchange resin (SHER), a newly synthesised catalyst for the esterification reaction. The experimental works were divided into two stages: (1) the synthesis and characterisation of the catalyst and (2) screening study on the esterification of FFAs in used cooking oil (UCO) using different types of ion-exchange resins. SHER was found to have excellent characteristics with high specific surface area ($\sim 836 \text{ m}^2 \text{ g}^{-1}$) and thermal decomposition temperature ($398 \text{ }^\circ\text{C}$). The SHER was then subjected to the esterification reaction and outperformed other catalysts with 90% FFA conversion followed by Diaion RCP145H, SK1BH and PK228LH. The excellent catalytic performance of SHER is due to the high specific surface area that allows FFA molecules to easily access their active sites.

KEYWORDS

Esterification; Free fatty acid; Used cooking oil ion-exchange resin; Catalyst

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