



Sequential conversion of high free fatty acid oils into biodiesel using a new catalyst system

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ABSTRACT

A sequential esterification and transesterification method was used successfully to convert high free fatty acid oil into biodiesel with almost 100% conversion. The esterification system was catalysed by ferric-alginate beads (0.16:1 ferric-alginate beads to lauric acid mass ratio, 15:1 methanol to lauric acid molar ratio, methanol refluxing temperature (65 °C), reaction time of 3 h) and transesterification was catalysed by boiler ash-calcium oxide mix (3 wt.% boiler ash, calcium oxide according to the stoichiometric amount of water produced in esterification, 15:1 methanol to oil molar ratio, methanol refluxing temperature (65 °C), reaction time of 0.5 h). Calcium oxide played a dual role to absorb the water produced by the esterification of free fatty acid and also as an active species for transesterification of triglycerides. This method was effectively used to convert palm fatty acid distillate to biodiesel with 100% conversion.

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