ABSTRACT

Five types of transesterification processes (acid-catalysed, base-catalysed, acid-base catalysed, iron(III) sulfate-base-catalysed and prawn shell-catalysed) were evaluated in terms of yield, bound glycerol content, density, viscosity and heat of combustion. The base-catalysed transesterification was carried out with methanol and sodium hydroxide as a catalyst while the acid-catalysed transesterification was carried out with methanol and 98% w/w concentrated sulfuric acid as a catalyst. The acid-base-catalysed transesterification was carried out by 2 hours of acid pretreatment followed by base-catalysed transesterification. The iron(III) sulfate-base-catalysed transesterification was carried out by 3 hours of iron(III) sulfate pretreatment followed by base-catalysed transesterification. The prawn shell-catalysed transesterification was carried out by carbonizing the prawn shells and allowing it to undergo reflux with the waste vegetable oil and methanol. For all processes, reflux was carried out at 65-70°C. Reflux time was kept at 3 hours except for acid-catalysed transesterification which requires 56 hours of reflux time. Results show that the conversion of waste vegetable oil to biodiesel was the highest through acid-base-catalysed transesterification and acid-catalysed transesterification (56 hours) and lowest in acid-catalysed transesterification (21 hours). Acid-base-catalysed transesterification produces biodiesel of the best quality, in terms of glycerol content and kinematic viscosity.