Effect of production parameters on the kinetic viscosity and others fuel properties of biodiesel prepared from waste cooking oil

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The use of waste cooking oils as raw materials for biodiesel production was studied. Number of methods are adopted to verify the purity of fatty acid methyl esters obtaining from transesterification process. In general, Gas chromatography (GC) technique is employed to determine the amount of biodiesel which is costly and time consuming process. Kinematic viscosity of oil is defined as the resistance to flow of a liquid which is correlated to components of biodiesel, therefore it is preferred to predict the yield of biodiesel production. The transesterification process of waste cooking oil with methanol: oil ratio of 1:9 was operated with NaOH as catalyst. In this study, the effect of temperature and time of oil treatment to kinematic viscosity at 40 ^{o}C (ASTM D 445) were investigated. The reaction times were range from 30-120 min and reaction temperatures were between 60 and 120 ^{o}C. The pretreated cooking oil before transesterification showed kinematic viscosity of 44.7 cSt. Transesterification process started at 60 ^{o}C following the conventional method for 30 min, the biodiesel was produced with kinematic viscosity of 4.9 cSt which decreased immensely almost 90% of the original material. Once the reaction time increased to 60 min, the kinematic viscosity of biodiesel decreased to 4.4 cSt, then raised again even though the reaction time was added. It seemed that the reaction time at 60 min for transesterification of waste cooking oil demonstrated the best value of kinematic viscosity. For better understanding of reaction temperature to kinematic viscosity, temperature variables of transesterification process were performed while reaction time was kept constant at 60 min. However, the viscosity of biodiesel prepared at higher reaction temperature (> 60 ^{o}C) acquired higher value. These results suggested that we may use kinematic viscosity as preliminary index for biodiesel production.

Keywords: Biodiesel;Waste oil; Kinematic viscosity;Production yield