ABSTRACT

The availability of fossil fuels in the last few decades has been depreciating. Increasing a needs fuel oil is unavoidable and will continue to occur due to the increasing population. The increasing use of diesel motors in industry is unlikely to stop just because the depletion of fossil fuels. In addition, the pollution caused by fossil fuel combustion emissions has become a serious threat. Biodiesel is one of the most environmentally friendly alternative fuels and is produced from renewable feedstock sources such as vegetable oils, waste cooking oils and animal oils. Vegetable oils, animal oils, or waste cooking oils are reacted with alcohols and NaOH catalysts through transesterification reactions. Waste cooking oils is one of the raw materials that has a high chance for biodiesel, in addition to containing a very abundant trigleserida, it is expected that the use of cooking oil as a raw material can reduce the price of biodiesel production significantly. This study aims to determine the effect of transesterification time on biodiesel conversion to obtain conversion biodiesel maximum from three types WCO oil obtained from different sources, and to know the characteristics of biodiesel. Biodiesel is made by giving some physical treatments, such as the duration of reaction time, and several variables such as the molar ratio between oil and methanol, as well as the amount of catalyst. To find out the influence of reaction time was done by using variation of time 60 minutes, 90 minutes, 120 minutes, and 150 minutes. Transesterification takes place inside a three-neck flask that has been fitted with condenser reflux, magnetic stirrer, and thermometer. The reaction temperature is used at 60°C. The molar ratio oil : methanol variations used were 1: 3, 1: 6, 1: 9, 1:12 and 1:15, and the amount of NaOH catalyst was 0.75% and 1% by weight of WCO. The result of raw material analysis shows that waste cooking oils has free fatty acid content of 1.834%. In this study, obtain a maximum conversion biodiesel at molar ratio oil and methanol 1: 6, 1% NaOH catalyst and 60 minutes reaction time. And the resulting biodiesel conversion from WCO of catfish seller is 85.26%, biodiesel from WCO's household used is 82.34%, and biodiesel from WCO's fried seller is 82.20%. Transesterification process of WCO and biodiesel products was analyzed by GC-MS and FTIR to determine the components of biodiesel and prove the formation of esters in the biodiesel. From the result of FTIR analysis, it can be seen that the spectrum between WCO with biodiesel is not much different. This difference identifies that the transesterification reaction has carried out perfectly by showing the presence of the methyl group compound and the ester which is the functional group of the biodiesel compound. While the results of GCMS analysis showed that the main compound of biodiesel from WCO are methyl palmitat and methyl oleat that is equal to 45.73% and 31.55%. Methyl palmitat and oleic has the potential to be a good quality biodiesel fuel. Based on the test of biodiesel characteristic which resulted are biodiesel density of 880 kg/m3, acid number 0,27 mg-KOH/g, maximum water content 0,05; and a pH of 7, indicating that the quality of biodiesel produced have fullfilled the SNI standard. From this research, it can be concluded that jelantah oil can be synthesized into biodiesel.

Keywords *: biodiesel, transesterification, waste cooking oil, conversion, reaction time, variable.*