

Abstract

This work aims to study the characteristic of waste palm oil and physic nut oil degradation and its effects on the production and quality of biodiesel. The experiment was carried out in two parts. The first part was a preliminary experiment to monitor the change of free fatty acid (FFA) content and kinematic viscosity over a period of 13 months and 10 months for waste palm oil (WPO) and biodiesel, respectively. The second part covered rigorous characterization of WPO degradation, where the storage time varied from 1 to 8 months at different storage conditions. The experimental results demonstrated that biodiesel produced from WPO kept at high temperature for longer than 5 months possessed high FFA content and peroxide value (PV) with significant increase in viscosity. This high PV indicates reduction of shelf life or lower oxidation stability of the biodiesel. Moreover, we found that the storage of WPO and biodiesel in contact with air (opened-lid container), especially at high temperature (about 40 °C), resulted in even higher FFA content, PV, and fluctuation towards higher viscosity than in close container. It was also found that iodine value decreased substantially, indicating high degree of oxidation reaction at double bonds of WPO and biodiesel. In this case, the production efficiency of biodiesel was found to be the lowest as indicated by the decrease in the %yield and %purity of biodiesel.