

A Glycerol-Free Process of Biodiesel Production through Chemical Interesterification of Jatropha Oil

Authors : Ratna Dewi Kusumaningtyas, Riris Pristiyani, Heny Dewajani

Abstract : Biodiesel is commonly produced via the two main routes, i.e. the transesterification of triglycerides and the esterification of free fatty acid (FFA) using short-chain alcohols. Both the two routes have drawback in term of the side product yielded during the reaction. Transesterification reaction of triglyceride results in glycerol as side product. On the other hand, FFA esterification brings in water as side product. Both glycerol and water in the biodiesel production are managed as waste. Hence, a separation process is necessary to obtain a high purity biodiesel. Meanwhile, separation processes is generally the most capital and energy intensive part in industrial process. Therefore, to reduce the separation process, it is essential to produce biodiesel via an alternative route eliminating glycerol or water side-products. In this work, biodiesel synthesis was performed using a glycerol-free process through chemical interesterification of jatropha oil with ethyl acetate in the presence on sodium acetate catalyst. By using this method, triacetine, which is known as fuel bio-additive, is yielded instead of glycerol. This research studied the effects of catalyst concentration on the jatropha oil interesterification process in the range of 0.5 – 1.25% w/w oil. The reaction temperature and molar ratio of oil to ethyl acetate were varied at 50, 60, and 70°C, and 1:6, 1:9, 1:15, 1:30, and 1:60, respectively. The reaction time was evaluated from 0 to 8 hours. It was revealed that the best yield was obtained with the catalyst concentration of 0.5%, reaction temperature of 70 °C, molar ratio of oil to ethyl acetate at 1:60, at 6 hours reaction time.

Keywords : biodiesel, interesterification, glycerol-free, triacetine, jatropha oil

Conference Title : ICSRD 2020 : International Conference on Scientific Research and Development

Conference Location : Chicago, United States

Conference Dates : December 12-13, 2020