

Transesterification of Refined Palm Oil to Biodiesel in a Continuous Spinning Disc Reactor

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Abstract : In the present work, spinning disc reactor has been used for the intensification of synthesis of biodiesel from refined palm oil (RPO) based on the transesterification reaction. Experiments have been performed using different spinning disc surface and under varying operating parameters viz. molar ratio of oil to methanol (over the range of 1:4.5-1:9), rotational speed (over the range of 500-2,000 rpm), total flow rate (over the range of 260-520 ml/min), and KOH catalyst loading of 1.50% by weight of oil. Maximum FAME (fatty acid methyl esters) yield (97.5 %) of biodiesel from RPO was obtained at oil to methanol ratio of 1:6, temperature of 60 °C, and rotational speed of 1500 rpm and flow rate of 520 mL/min using groove disc at KOH catalyst loading of 1.5 wt%. Also, higher yield efficiency (biodiesel produced per unit energy consumed) was obtained for using the spinning disc reactor based approach as compared to the ultrasound hydrodynamic cavitation and conventional mechanical stirrer reactors. It obviously offers a significant reduction in the reaction time for the transesterification, especially when compared with the reaction time of 90 minutes required for the conventional mechanical stirrer. It can be concluded that the spinning disk reactor is a promising alternative method for continuous biodiesel production.

Keywords : spinning disc reactor, biodiesel, process intensification, yield efficiency

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