World Academy of Science, Engineering and Technology
International Journal of Chemical and Materials Engineering
Vol:9, No:07, 2015

Thermal Cracking Approach Investigation to Improve Biodiesel Properties

Authors : Roghaieh Parvizsedghy, Seyyed Mojtaba Sadrameli

Abstract : Biodiesel as an alternative diesel fuel is steadily gaining more attention and significance. However, there are some drawbacks while using biodiesel regarding its properties that requires it to be blended with petrol based diesel and/or additives to improve the fuel characteristics. This study analyses thermal cracking as an alternative technology to improve biodiesel characteristics in which, FAME based biodiesel produced by transesterification of castor oil is fed into a continuous thermal cracking reactor at temperatures range of 450-500°C and flowrate range of 20-40 g/hr. Experiments designed by response surface methodology and subsequent statistical studies show that temperature and feed flowrate significantly affect the products yield. Response surfaces were used to study the impact of temperature and flowrate on the product properties. After each experiment, the produced crude bio-oil was distilled and diesel cut was separated. As shorter chain molecules are produced through thermal cracking, the distillation curve of the diesel cut fitted more with petrol based diesel curve in comparison to the biodiesel. Moreover, the produced diesel cut properties adequately pose within property ranges defined by the related standard of petrol based diesel. Cold flow properties, high heating value as the main drawbacks of the biodiesel are improved by this technology. Thermal cracking decreases kinematic viscosity, Flash point and cetane number.

Keywords : biodiesel, castor oil, fuel properties, thermal cracking
Conference Title : ICACCE 2015 : International Conference on Applied Chemistry and Chemical Engineering
Conference Location : Paris, France
Conference Dates : July 20-21, 2015