



## 11<sup>th</sup> International Scientific Conference on Applied Sciences and Engineering

3-4 September, 2016

Hotel Istana Kuala Lumpur City Centre, Kuala Lumpur, Malaysia

Conference Website: [www.scihost.org](http://www.scihost.org)



Paper ID: 27/16/ 11<sup>th</sup> ISCASE

### Synthesis of Biodiesel from Tropical Almond (*Terminalia catappa*) Seed Oil

Orhevba, B.A<sup>1</sup> --- Adebayo, S. E<sup>2</sup> --- Salihu, A.O<sup>3</sup>

<sup>1,3</sup>Department of Agricultural and Bioresources Engineering, Federal University of Technology, PMB 65, Minna, Niger State, Nigeria

<sup>2</sup>Department of Biological and Agricultural Engineering, Universiti Putra Malaysia, Serdang Selangor, Malaysia

#### Abstract

Biodiesel an example of liquid biofuels is broadly acknowledged as technically appropriate substitute for petrodiesel. The objective of this study is extraction and characterization of oil from tropical almond seed, trans-esterification and characterization of tropical almond seed oil biodiesel. All experiments were replicated and average results were evaluated. The moisture content of the seed was 2.04 %; the oil was extracted using solvent method and the percentage of oil yield was 50.33 %. The physicochemical properties of the oil obtained during the experiment were; density (0.90 g/cm<sup>3</sup>), specific gravity (0.89), kinematic viscosity at 40 oC (14.1 mPa.s), cloud point (16.0 oC), pour point (11.5 oC), smoke point (173.0 oC), flash point (208.0 oC), fire point (271.0 oC), saponification value (199.19 mgKOH/g), acid value (3.37mgKOH/g), FFA (1.68 mgKOH/g), Peroxide value (5.0 meq/kg), and Iodine value (98.0 gI<sub>2</sub>/100g). The oil was trans-esterified to biodiesel using oil to alcohol ratio of 4:1 and KOH as catalyst. The percentage of biodiesel yield was 75.0 % averagely. The physicochemical properties of the biodiesel obtained during the experiment were; density (0.96g/cm<sup>3</sup>), specific gravity (0.90), kinematic viscosity at 40 oC (5.20 mPa.s), kinematic viscosity at 100 oC (4.30 mPa.s) cloud point (7.0 oC), pour point (6.0 oC), smoke point (161.0 oC), flash point (186.0 oC), fire point (216.0 oC), saponification value (182.4 mgKOH/g), acid value (0.84 mgKOH/g), FFA (0.42 mgKOH/g), Peroxide value (8.0 meq/kg), and Iodine value (109.0 gI<sub>2</sub>/100g, the calculated cetane number was 51.70. The result obtained for the physicochemical properties of the biodiesel were compared with the ASTM standard and it was concluded that tropical almond seed oil is a good feedstock for biodiesel production since the result is within ASTM specification standard.

**Keywords:** Almond seed, Biodiesel, Physicochemical properties, Cetane number, Pour point