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Biodiesel Yield of Oil from Four Varieties of Pre-treated Castor Seeds (*Ricinus Communist l*)

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Statement of the Problem: The environmental effects (global warming) caused by the usage of fossil fuel and the environmental benefits of using renewable and environmental friendly energy resource has made biodiesel more attractive in recent times. Studies have been conducted on the transformation of castor oil into biodiesel. However, the varieties of castor oil used were not specified and little effort has been made to address the effects of oilseed pre-treatment methods on biodiesel yield and properties. This study therefore, investigates the production and characterization of biodiesel using oil expressed from four varieties of pre-treated castor seeds.

Methodology: Oil was expressed from each of the pre-treated castor seeds varieties using hydraulic press. The extracted oils were transesterified by reacting them with anhydrous methanol, using potassium hydroxide (KOH) as catalyst. The process parameters used were three levels of catalyst concentration, three levels of reaction temperature, three levels of reaction time, three heating methods and two seeds conditions. In all the experiments, a methanol/castor oil molar ratio of 6:1 was used. Biodiesel yield was calculated and the fuels obtained were characterized to determine the fuel properties.

Findings: A regression model was developed for biodiesel yield and response surface method (RSM) was used to confirm the polynomial equation solved using the Design-Expert 7.0 Software.

Conclusions: Highest biodiesel yield of 98.20% was obtained from raw dehulled GMS. Biodiesel yield varied with seed variety and was influenced by heating method, catalyst concentration, seed condition and their interactions. Biodiesel from oil of GMS variety possessed the best set of fuel properties and is therefore recommended for use in biodiesel production. The developed mathematical models adequately simulated the biodiesel production process and can be applied to the process involving oils of different origin.

Biography

Fasiu A Oluwole is a Senior Lecturer at the Department of Mechanical Engineering, University of Maiduguri, Maiduguri, Borno State, Nigeria. His research interest is on renewable energy with special interest in biofuels. He has built up this career after years of experience in research, evaluation, teaching and administration both in education institutions and development/fabrication of processing equipment. He has published more than 30 papers in reputed journals

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