



Reaction Parameters Affecting Production of Biodiesel from Cashew Nuts (*Anarcadium occidentale*) Reject Oil

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Abstract: This study showed the reaction parameters affecting production of biodiesel from Cashew nut (*Anarcadium occidentale*) reject oil. Cashew nut rejects were thoroughly screened, milled and the oil (CNRO) was extracted using soxhlet method. The physico-chemical properties of the oil were determined using AOAC standard method. Biodiesel was produced by transesterification of the oil with methanol using calcium oxide (CaO) as the heterogenous catalyst at a temperature of 70°C. A laboratory scale mixer for batch mode was used to investigate the effect of operating variables: molar ratio (6:1, 9:1, 12:1 and 14:1), catalyst (1.6, 3, 5, 7, 8.4) and reaction time (1, 2, 3, 4). The Response Surface Methodology (RSM) was used to optimize the conditions of biodiesel production which was then purified using wash method. The experimental design and statistical analysis was done by Design Expert 6.0.8 program. The physico-chemical properties of CNRO were determined as follows: Colour (winsor orange), Specific gravity (0.909), Refractive index (1.42), Saponification value (212 mgKOH/g), Iodine value (50.61 mgI₂/100 g), Peroxide value (10.58 meq/kg) and Free Fatty Acid (22.44%). The transesterification reaction was significantly affected by various interactions between the process variables with optimum biodiesel value (70.84%) at the optimal catalyst of 3%, methanol to oil molar ratio 9:1 and reaction time at 60 minutes. The increase in the mass of catalyst above 3% slightly reduced the biodiesel yield. The study showed that CNRO is suitable for biodiesel production and its biodiesel has the potentials to power a compressing ignition engine. Hence, commercial production of the biodiesel is hereby advocated.

Keywords: *Cashew Nut Reject (CNR) and Cashew Nut Reject Oil (CNRO)*

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