

PRODUCTION OF ETHANOL FUEL FROM SELECTED AGRICULTURAL RESIDUES AT DIFFERENT SUGAR CONCENTRATIONS

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ABSTRACT

Frequent increase in price of petroleum products and interest in environmental issues, has led to the demand for in developed countries. Ethanol was produced from 500.0 g each of the grounded residues collected at a dump site near Arada market in Ogbomosho at different sugar contents (10, 20, 30 and 40 mL) by using acid hydrolysis with 4 M H₂SO₄, and simultaneous saccharification and fermentation with *Aspergillus niger* and distillation. The fuel properties of ethanol produced were also determined using standard procedures in order to determine its suitability as a fuel in automotive engine.

The results show that the volume of ethanol produced from the three residues increases as the amount of sugar content increases. Plantain peels produced the highest volume of ethanol (17.00, 18.20, 20.50 and 22.50 mL) while groundnut shells produced the lowest volume (7.00, 8.00, 10.00 and 12.00) at 10, 20, 30 and 40 mL of sugar contents respectively. Calorific values, relative density, viscosity and pH were found to be 28,400, 27,800 and 26,860 kJ/Kg, 0.81, 0.79 and 0.75, 1.59, 1.58 and 1.56 m²s⁻¹ and 2.50, 4.80 and 4.05 for ethanol produced from corn cobs, groundnut shells and plantain peels respectively at 40 mL sugar. Also, the flash and pour points of ethanol produced from corn cobs, groundnut shells and plantain peels were 35.40, 41.40 and 40.50 °C and 2.70, 4.70 and 5.55 °C respectively at 40 mL. Based on the findings of this study, plantain peels produced more ethanol than the other two residues and the properties of ethanol determined were found to have acceptable fuel properties for use as supplementary fuel in automotive engine engines.

KEYWORDS: Ethanol, Fuel, Residue Sugar, Properties and Fermentation