

Analisa Komparatif Pengaruh Penambahan Ampas Tebu Terhadap Nilai Kalor Campuran Cangkang Kernel Kelapa Sawit Sebagai Bahan Bakar Mesin Boiler

Comparative Analysis of the Effect of Sugarcane Bagasse Addition on the Calorific Value of Palm Kernel Shell Mixture as Boiler Engine Fuel
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ABSTRACT

The use of biomass as an alternative fuel for boilers is one of the efforts to improve energy efficiency and reduce dependence on fossil fuels. This study aims to analyze the effect of the addition of sugarcane bagasse on the calorific value of the oil palm kernel shell mixture and evaluate the characteristics of moisture content, ash content, and combustion speed. The research was conducted using a laboratory experiment method with a Group Random Design (RAK) consisting of six treatments, namely 45% palm kernel shells + 55% bagasses, 50% + 50%, 20% + 80%, 70% + 30%, 100% palm kernel shells, and 100% bagasses. The observed parameters included calorific value, moisture content, ash content, and combustion speed, while the data were analyzed using the ANOVA test and the Duncan follow-up test. The results showed that the variation in biomass composition had a significant effect ($P < 0.05$) on fuel characteristics. The highest calorific value was obtained in 100% bagasse at 4750.31 kcal/kg, the lowest moisture content in a mixture of 50% palm kernel shells and 50% bagasse at 7.49%, and the lowest ash content in 100% palm kernel shells at 1.29%. The mixture of 50% palm kernel shell and 50% bagasse showed the best combustion speed stability with a determination coefficient value (R^2) of 0.975. Based on all parameters, the composition of 50% palm kernel shell and 50% bagasse is the most optimal formulation as an alternative fuel boiler because it produces the best balance between calorific value, moisture content, ash content, and combustion stability

Keywords: *bagasse, oil palm kernel shell, biomass, calorific value, moisture content, ash content, combustion speed, boiler*