

## **Fabrication of briquettes from charcoal fines using tannin formaldehyde resin as a binder**

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### **Abstract**

Charcoal fines, a waste emanating from charcoal transportation and handling, were utilized in the fabrication of briquettes using tannin-formaldehyde resin as a binder to meet ever expanding energy demand. A collection of four briquette samples were fabricated with binder proportions of 25%, 30%, 35%, and 40%. These briquettes were characterized using Fourier transform infra-red and thermogravimetric analyses techniques. Furthermore, the briquettes were subjected to physical parameters namely bulk density, impact resistance index (IRI), water resistance index (WRI), and water boiling test. The bulk density of the briquettes was 1.153-1.495 g/cm<sup>3</sup>, IRI was 6.79-73.33, and WRI was 99.24-99.29. The briquettes exhibited an ignition time of 5.38-6.21 minutes, boiling time of 19.50-37.20 minutes, burning rate of 3.20-8.70 g/minute, and a specific fuel consumption of 54.70-64.30 g/L. Higher heating value range for the briquettes was 19.76-23.23 MJ/kg and the briquettes with 40% binder showed the best physical qualities with great fuel potential. Therefore, the fabricated briquettes have demonstrated great potential as a source of cleaner and sustainable energy.

**Keywords:** Briquette, tannin-formaldehyde resin, charcoal fines, bulk density, calorific value