

- **Thermal energy assessment of oil bean stalk as a novel additive to building ceilings**

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ABSTRACT

The thermal properties of oil bean stalk, an agro-waste, are inadequately studied; thus this research seeks to assess its property suitability as a prospective material for ceiling tile production. The material was cut to 50mm diameter with jig saw to fit into brass profile of the automatic Lee's disc thermal conductivity apparatus. This profile was also used to conduct the specific heat capacity test by employing the method of mixtures. The specific heat capacity, density, thermal conductivity, thermal resistivity, thermal diffusivity, thermal effusivity and cooling rate are 1563J/kgK, 158kg/m³, 0.12 Wm⁻¹K⁻¹, 8.68mKW⁻¹, 4.86 x 10⁻⁷ m²s⁻¹, 172.15 Jm⁻²K⁻¹s^{-1/2} and 0.0014 °C/sec. The high energy values of specific heat and thermal effusivity shows the reluctance of the material to dissipate energy to the surrounding which approves it as a building material insulator. The values are within the class of insulating material required in building technology such as building ceiling tiles. This potential insulating material can be explored in the building industries as the material is readily available in the environment.