

Analysis of Material Mixture Variations in the Preparation of Banana Peel and Orange Bio-Battery Paste

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ABSTRACT

*Indonesia, as an agrarian country, generates significant amounts of banana and orange peel waste, which holds potential as eco-friendly bio-battery material. This study investigates the effect of varying compositions of plantain banana (*Musa paradisiaca*) and sweet orange (*Citrus sinensis*) peels on the electrical characteristics of bio-batteries. Eleven samples with peel ratios ranging from 0–100% were tested over 6 hours, analyzed using XRF and pH meters. XRF results revealed banana peels are rich in potassium (77.33%) and orange peels in calcium (39.22%). The B1 sample (100% orange) produced the highest initial voltage (0.7897 V) but declined rapidly, while B11 (100% banana) exhibited more stable voltage and the longest lifespan (18 hours 2 minutes). The bio-batteries achieved up to 53.65% of the voltage and 44.40% of the current of standard AA batteries. Although still less efficient than conventional cells, this study highlights the renewable energy potential of bio-batteries using organic waste.*

Keywords: *bio-battery, banana peel, orange peel, renewable energy, electrical characteristics.*