

Electrical Insulative Properties of Some Agro-Waste Materials

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Abstract

Insulating materials are used in electrical power circuits to prevent leakages of current. This work investigates the possibility of using agro-waste materials: shells of coconut, mango endocarp, palm kernel, groundnut and bean as well as corncob and rice husk, as electrical insulators. Accordingly, electrical insulative properties: dielectric strength, resistivity, dielectric constant, moisture content and water absorption capacity of these waste materials were determined. Each of the materials was washed, air dried for 2 weeks, ground into powder, and sieved with, the U.S Standard Sieve No. 40. It was then bound with a 200 g/litre aqueous solution of gum Arabic, and moulded into various shapes and thicknesses which were air dried for a week. Their dielectric strengths were tested thereafter, using a variable transformer tester; their resistivities measured with an insulation tester, while both moisture contents and water absorption capacities were determined gravimetrically on dry weight basis. The results showed that the electrical insulative properties of these materials were comparable with the known standard values. However, their moisture contents and water absorption capacities were relatively high, thereby limiting their usefulness as insulators in their ordinary states. Based on their dielectric constants and a standard table, coconut, palm kernel and groundnut shells, with dielectric constants range of 3.5-5.5 fall into high voltage applications; mango shell, corncob, rice husk and bean shell, with dielectric constants less than 3.0, fall into the low voltage application category.