

## **Frequency Dependent Electrical Characterization of Rock Types from Ewekoro, Eastern Dahomey Basin.**

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### **Abstract**

Dielectric measurement (40 Hz – 110 MHz) conducted on samples of limestone and its associated rocks from Ewekoro, Eastern Dahomey Basin has yielded vital information for characterization. Cole-Cole plots manifest a distribution of relaxation times in the rock samples common for multicomponent systems. All the rock types show dielectric dispersion in dry and partially saturated conditions, but the frequency range differs for the rock types and depends on wettability. At partial water saturation there is: (i) enhanced polarization resulting in increase in real and imaginary permittivities; (ii) shortened region of dielectric dispersion; (iii) broadened electrode polarization plateau; and (iv) steeper and shorter dispersion region. Irrespective of the state of the rocks, values of the dielectric parameters for shale and glauconite are at least an order greater than for limestone and sandstone. Geometric or textural effects are partly responsible for the observed differences coupled with the presence of charged clay/clay-like particles in shale and glauconite. Decrease in relaxation and critical frequencies in partial saturation for shale in contrast to the increase of these frequencies for the other three rock types is due the effect of pore geometry on overall dielectric relaxation. This study shows that dielectric measurement can complement geochemical analysis in laboratory evaluation and characterization of rock raw materials.

**Keywords:** Dielectric dispersion, partial saturation, rock types, loss tangent, frequency response.