

## **Geomathematical Modeling of Hydrocarbon Generative Windows of Ogbogede On-shore Field in Niger Delta Basin, Nigeria**

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Oil and gas windows of an on-shore field in Niger Delta were determined from the geomathematics modeled from geotemperature analysis of the source rocks. The Lithologic units of Benin and Agbada Formations were quantitatively interpreted from gamma-ray and resistivity logs obtained from the four producing wells in the field. The log analysis shows that Benin Formation comprises massive sand with clay/shale intercalation while Agbada Formation comprises alternate sequence of sandstone and shale. Benin and Agbada Formations share boundary at about 2262.5m. The boundary between Agbada and Akata Formations could not be delineated because all the wells terminated within Agbada Formation. The geothermal gradients calculated in the field range from 1.4°C/100m to 2°C/100m with an average of 1.8°C/100m and standard deviation of 0.2°C/100m. The geotemperature analysis of shale units of Agbada Formation calculated from mathematical model gave a value range of 58.92°C-107.6°C, indicating that they are thermally matured. A further mathematical analysis shows that oil window occurs from approximately 1833.3m to 5166.67m while gas window occurs from about 5166.67m to 11000m. Metagenesis of the hydrocarbon generate graphite of about 1000m thick. This work has provided a more direct, easy, and cheaper method of source rock /formation evaluation. The outcome is a very important tool which can be applied to other fields and sedimentary basins.