Depositional Environment and Organic Geochemical Evaluation of Middle Cretaceous Oil Shale Section at Lokpanta, Lower Benue Trough Nigeria: Implications for Hydrocarbon Potential

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Organic petrography and geochemical techniques such as Total Organic Carbon (TOC) determination and maceral analysis have been used to evaluate the source rock potential of the Cenomanian - Turonian Lokpanta Shale of the Eze-Aku Formation. TOC values for the shale range from 1.18-3.03wt% with an average TOC value of 2.11wt%, indicating adequate concentration of organic matter. Maceral analysis data indicate the prevalence of terrestrially derived Type III (vitrinitic) kerogen and admixtures of Type II (liptinite) and Type IV (Inertinite) kerogens. These suggest that the source rock in the study area have a good potential for the generation of gaseous and liquid hydrocarbons. Qualitative and quantitative micro paleontological study of microfossils in the shale samples showed the presence of benthic foraminifera species of Gavelinella Sp, Praebulimina Robusta, Fursenkoina Sp, and planktic foraminifera variety of Heterohelix fayose, Gumbelitria cenomana, Heterohelix moremani, Heterohelix reussi, Hedbergella cf. in the ratio of 35/65. Analysis of Rare Earth Elements (REE) indicate a negative europium anomaly and early diagenesis of the shales while major element (oxide) showed high concentration of $Si0_2$ and CaO in the shales. The presence of Inoceramus Labiatus, abundance of planktic foraminifera, parallel lamination and high CaO contents in the shales indicate that this calcareous shale was deposited below wave base in a quiet shallow marine environment. The data reaffirm that the calcareous Lokpanta shale has adequate organic matter as a candidate source rock for hydrocarbons in the study area.