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**Geochemical Characterization of Source Rocks and Oil Seepages from Southern Benue
Trough, Nigeria**

Ehinola, O.A.¹, Yuhong, L.² and Babatunde, O.¹

¹Department of Geology, University of Ibadan, Ibadan-Nigeria

²Institute of Geology and Geochemistry, CAS, Gangzhou, P.R. China

The Nigeria southern Benue Trough include: the Anambra basin, Afikpo syncline and Abakaliki anticlinorium, harbouring the largest deposit of sub-bituminous coal and lignite. Oil seepages have also been reported from parts of the Anambra basin. The potential of the coal and other formations as source rock for the oil seepages is yet to be fully understood. This study therefore aims at identifying the source rocks and the geochemical composition of the oil seepage.

Detailed lithologic profiles were carried out on the following geological formations: Asu River, Eze-Aku, Awgu shale, Nkporo Shale, Mamu, Enugu Shale, and Ameki Formations and 50 samples were selected. Organic geochemical analysis involving total organic carbon content (TOC), Rock-Eval pyrolysis, and Gas chromatography (GC) were carried out.

The Asu River, Eze-Aku, Awgu shale, Nkporo, Mamu, Enugu, and Ameki Formations, have average TOC values of 0.68, 2.7, 2.0, 3.09, 56.1, 3.26, and 1.56 wt%, respectively. This indicates that both shale and coal have adequate organic matter to generate hydrocarbon. The plot of TOC against Hydrogen index (HI) suggests that the coal samples are of type III/IV kerogen while that of the shale sample suggest type II/III kerogen (mixed environment).

The level of thermal maturity as estimated from the plot of Tmax against production index (PI) suggest that the shales range from immature to marginally mature source rock while the coal is of low level conversion. The GC result indicates that the *n*-alkanes and isoprenoids in the oil seepage samples are completely depleted while steranes are seriously altered. Regular steranes {C₂₇aaR, C₂₈aaR and C₂₉aaR} and C₂₉, C₃₀, C₃₁ Hopanes are all consumed up, but Diasteranes {C₂₇Dbas, C₂₇DbasR} and 25-Norhopanes (C₂₈, C₂₉) are relatively high. This suggests that the oil seepage is highly biodegraded and could be placed on level 9 of Peter and Moldowen (PM) scale.

The geochemical analyses of some selected samples showed that high organic richness is observed within the Eze-Aku, Awgu, Nkporo, Mamu (coal), and Enugu Formations and they could be regarded as the main oil source formations of the Anambra basin.