

GEOCHEMISTRY, CLASSIFICATION AND MATURITY OF THE SANDSTONE FACIES OF THE ABEOKUTA FORMATION, SOUTH WESTERN NIGERIA

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ABSTRACT

The geochemistry, classification and maturity of the sandstone facies of the Abeokuta Formation were investigated. A decrease in the abundance of TiO_2 , Fe_2O_3 , CaO , Na_2O , MgO , MnO , K_2O , and Al_2O_3 as SiO_2 increases was not the trend observed, this could be due to sediment mixing. Arsenic concentration is much higher than that for the UCC which may be due to contamination. Ce, Cu, Pb, V, Y, Zn and Zr were enriched compared with UCC and average sedimentary rocks. The sandstone is extremely depleted in REE (only Ce and Y present) due to dilution effect of quartz. The sandstones exhibited varying classification nomenclatures using different classification schemes, which may be due to sediment supply from different sources. However, the sandstones are rich in iron, potassic and rich in lithic materials--they can thus be classified as litharenites and sub-arkoses. The sandstones have a low $\text{SiO}_2/\text{Al}_2\text{O}_3$ value (avg. 7) suggesting chemical immaturity; high degree of clayness and less calcified. The high $\text{Fe}_2\text{O}_3/\text{K}_2\text{O}$ ratio (avg. 13) with low $\text{SiO}_2/\text{Al}_2\text{O}_3$ ratio shows that they are mineralogically less stable and more prone to reactivity during supercritical CO_2 exposure. The alkali content indicates the presence of feldspars and low chemical maturity. Index of compositional variation (ICV) values shows that the sandstones are mineralogically immature. The plot of ratio $\text{SiO}_2/\text{Al}_2\text{O}_3$ against quartz / (feldspar + lithic fragments) shows that the sandstones are immature. The ZTR indices suggest that nearly all the sediments are mineralogically immature to sub mature but the mineralogical maturity index classifies the sediments as sub mature to super mature. On the Al—Ti—Zr diagram, the sandstones plotted in the CAS zone and outside all fields with a limited range of TiO_2/Zr variations, suggesting poor sorting and rapid deposition.

Keywords: Abeokuta Formation, sandstones, maturity, classification.