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Compositional features, and relative prospectivity assessment of Rare metal (Ta-Nb-Sn) Precambrian Pegmatite of southwestern Nigeria.

Abstract

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Increase in the global demand and positive economic outlook for metallic minerals especially the Ta-Nb-Sn type necessitates resurgence of interest in the systematic search for them. Hence, rare metal Precambrian pegmatite bodies have been studied in the southwestern part of Nigeria, with the aim of elucidating their compositional features, economic potentials and prospectivity.

Two hundred and fourteen of these bodies, of variable dimensions, intruding gneisses, schist and sheared granites and occurring as near vertical NE-SW, NW-SE trending semi discordant dykes have been mapped in ten designated sub fields namely Komu, Lema-Ndeji, Olode-Falansha, Ago Iwoye, Odo-Ere, Ara-Aramoko, Awo, Oro, Sepeteri and Ijero.

Compositionally, on the basis of texture and silicate mineralogy, complex, in most cases, with the alkali feldspar, graphic granite, coarse grained quartz- albite- muscovite- tourmaline, fine grained sacharroidal albite-muscovite-tourmaline-garnet pegmatite types are recognized. Geochemical signature reveal their affinity with the lithium-Cesium-Tantalum, (LCT) and few of Niobium, Yttrium, Fluorine, (NYF) family with both the Beryl- Columbite, Be, Nb > Ta (\pm Sn, B) and minor lepidolite F, Li, Rb, Cs, Be, Ta- Nb as subtypes. The veins are mostly siliceous, MgO, TiO₂ and MnO values are all less than 0.4%, while Ta, Nb, Sn values are in the range of (2.5-906ppm) (4.0-626ppm) and (7.1-1100ppm) respectively. Rb, Sr, content suggest derivation largely from remelting of supracrustals, REE value are generally low. However, high fractionation is evident with relative high LREE La, Ce, Pr and low HREE with attendant negative Eu anomalies and dominant Kinking. Sodic albitization from Na/K ratios is not consistent with Ta-Nb-Sn potentials while rare metal potential assessment plot of Ta/ K/Cs, Ta/ Ga, Ta/ Cs, Ta/K reveal the samples plotting above cut off values for economic mineralization when compared to Tanco, Noumas and Wodgina global occurrences.

Overall geochemical features and prospectivity maps derived from chemical abundance of Ta, Nb, Sn plotted for the various sub fields, show highest potential and hence prospectivity in Lema - Ndeji sub field and the least in the Ago Iwoye subfield

