

GEOCHEMISTRY OF BASEMENT GRANITOIDS, CHENCHU COLONY AREA, GUNTUR DISTRICT, ANDHRA PRADESH

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Abstract

Chenchu colony area, Guntur district, Andhra Pradesh, is targeted for sub-surface exploration based on favourability criteria for Proterozoic unconformity-related fracture-controlled uranium mineralisation. Geologically, Neoproterozoic to Palaeoproterozoic granitoids form basement for the overlying Neoproterozoic Kurnool Group of sediments (Banganapalle and Narji Formations). These granitoids are substantially reactivated in nature as evident from the presence of fractures/faults, mafic dykes and quartz/quartzo-feldspathic veins. Geochemically, they (n=17) show wide variation in SiO₂ (68.12–76.65%), Al₂O₃ (11.34–17.29%), K₂O (4.30–9.96%), Na₂O (0.21–3.14%) and CaO (0.08–3.87%) contents while two highly altered and radioactive granitoids (171 and 445 ppm U) exhibit comparatively low average abundance of SiO₂ (64.54%) and high abundance of Al₂O₃ (18.56%) and K₂O (7.96%). Total alkali content of these granitoids varies from 7.13 to 10.17% with an overall predominance of potassium over sodium. They belong to granite–adamellite suite and exhibit a predominant peraluminous nature (A/CNK: 1.01–1.87; except for three samples with values of 0.67–0.95), signifying derivation of the magma from sedimentary or supracrustal sources with S-type signature. This is further substantiated by low sodium (<3.2% Na₂O) and high potash (~5% K₂O) contents as well as sample plots in Altherr's diagram [mol CaO/(MgO+FeO) vs mol Al₂O₃/(MgO+FeO)], indicating generation of these granitoids by partial melting of metapellitic (crustal) sources. Petrographic evidences viz., presence of K–feldspar (orthoclase, microcline), both varieties of mica (muscovite and biotite), monazite and apatite support the above observation. In Rb–Nb+Y and Nb–Y tectonic discrimination plots, these granitoids straddle in the fields of volcanic arc granite (VAG) and syn-collision (syn-COLG), signifying evolution in subduction-related arc magmatism in a collisional environment, which is further corroborated by sample plots in syn-collision field in R1–R2 diagram. Such reactivated S-type granitoids with high intrinsic uranium (19ppm U) form a potential and fertile source, which may lead to uranium mineralisation under favourable conditions in an unconformity proximal setup.

Keywords: Basement Granitoids, Geochemistry, Uranium, Chenchu Colony, Palnad Sub-basin