

PETROGENESIS OF A SYENITE FROM GOLLA AREA: IMPRINTS OF SHOSHONITIC MAGMATISM AND LITHOSPHERIC HETEROGENITY IN THE EASTERN DHARWAR CRATON, SOUTHERN INDIA

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Abstract

This paper reports a minor occurrence of syenite, its field geological, petrographic and petrogenetic characteristics, at Golla area of Anantapur district, Andhra Pradesh. The syenite occurs within the Peninsular gneissic complex (PGC) as a small sheared intrusion with a steep dip of 70° due south-east. The rock in hand specimen shows a fine to medium grained texture, predominance of orthoclase with minor amounts of plagioclase. The accessory mafic constituents, though not abundant, include mica and amphibole with minor amounts of epidote and opaques such as ilmenite and magnetite. Mineral chemistry of feldspars shows dominance of orthoclase ($Ab_{15}An_{0.2}Or_{84.8}$) and oligoclase ($Ab_{74}An_{24}Or_2$). The micas are identified to be biotite. In the QAPF diagram, the rock ranges from alkali feldspar syenite to monzonite in composition. The major element concentration ranges are: 53.5- 57.23wt.% SiO_2 , 6.3-8.2wt.% K_2O , 3.78-5.49wt.% Na_2O and 11-13wt.% total alkalis indicating an alkaline character. The ΣREE concentration ranges from 379 to 508ppm. The normative hypersthene in CIPW norms indicates that these rocks can be classified under the sub-alkaline group; though, they show an alkaline to peralkaline character with shoshonitic affinity. The whole rock geochemistry clearly reflects shoshonitic parentage for this intrusion. The chondrite normalised REE patterns indicate LREE enrichment over HREE with a conspicuous negative Eu anomaly ($Eu/Eu^* = 0.02-0.04$) indicating plagioclase fractionation at the source. The intrusive body shows affinity towards the within-plate or intracratonic tectonic regime, and crystallising under conditions of low oxygen fugacity. Emplacement of a variety of rare intrusions such as alkali syenites, syenites, lamprophyres, lamproïtes, kimberlites within the granitoid-gneissic country in this region demonstrates a highly heterogeneous sub-continental lithospheric mantle beneath this part of the craton.

Keywords: Syenite, alkali feldspar, shoshonitic, geochemistry, petrogenesis, EDC.