

**MAJOR AND TRACE ELEMENT GEOCHEMISTRY OF PALAEOPROTEROZOIC
NANDED GRANITOIDS OF DIGLUR–BIL OLI–DHARMABAD SECTOR,
NANDED DISTRICT, MAHARASHTRA: GEODYNAMIC AND
PETROGENETIC IMPLICATIONS**

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Abstract

Diglur–Biloli–Dharmabad sector exposes Palaeoproterozoic Nanded granitoids (NG) belonging to the northern extensions of Peninsular Gneissic Complex (PGC) within Deccan Trap country. They are predominantly represented by coarse grained to porphyritic pink and grey granites with patches and enclaves of mafic rocks and are profusely traversed by pegmatitic/quartzofeldspathic/quartz veins and ENE–WSW, NE–SW and WNW–ESE trending mafic dykes. Geochemically, they are similar to medium- to high-K, calc-alkaline granitoids with higher total alkali content (5.96–11.52%) and show an overall predominance of K over Na. Higher abundance of LILE and incompatible HFSE indicate important role played by the fractionation and progressive differentiation in the formation of these highly evolved granites. These elements are mostly associated with resistate minerals such as zircon, monazite, thorite, allanite and sphene. The compositional diversity of NG ranging from granite(s.s.) to granodiorite–adamellite suite with predominantly metaluminous to mild peraluminous nature and presence of biotite±hornblende as the dominant ferromagnesian minerals point towards derivation of magma from upper mantle or lower crustal source with I-type signatures in active continental margin setting. Negative correlation of SiO₂ with MgO, FeO^t, CaO, Al₂O₃ and positive correlation with K₂O and Na₂O substantiates highly fractionated nature of these granitoids, whereas high differentiation index (71.36–97.10), enrichment of K at the expense of Ca and ubiquitous presence of pegmatoids point towards derivation from sub-crustal source by partial melting in a volatile rich system with S-type features. Hence, it appears that crustal contamination has caused distortion in major and trace element representation and show gradation between mantle-dominated and crust-dominated patterns.

Anomalous radioelemental concentration (upto 1403 ppm U and 1600 ppm Th; n=69) has been recorded in NG and distribution pattern of heat producing elements (U, Th and K) have indicated high heat production values (1.25–480.4 μWm^{-3}), which might have played important role in uranium remobilisation and concentration by supporting hydrothermal gradient along the dilatant structures. Considering highly labile nature of uranium in this reactivated terrain, the Nanded granitoids form a potential fertile provenance for uranium mineralisation.

Keywords: High heat producing (HHP) granite, Geochemistry, Geodynamic, Petrogenesis, Nanded.

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