

GEOCHEMISTRY AND PETROGENESIS OF A-TYPE GRANITES FROM THE GAVILGARH-TAN SHEAR ZONE, CENTRAL INDIA: IMPLICATIONS FOR TECTONIC SETTINGS

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Abstract

The Gavilgarh-Tan Shear Zone (GTSZ) is a prominent unit in the Central Indian Tectonic Zone (CITZ). Petrographically, the studied rocks constitute a combination of coarse to medium-grained pink granite, medium to fine-grained grey granite, coarse to medium porphyritic biotite-rich pink granite, mineralogically composed of quartz, K-feldspar, plagioclase, and biotite with accessory tourmaline, chlorite, apatite, titanite, magnetite, ilmenite and zircon. The geochemical signatures of the studied rocks are characterized by granite-granodiorite-trondhjemite, calcic-alkalic affinity with metaluminous to peraluminous compositions. The negative correlation of major oxides (P_2O_5 , CaO, TiO_2 , Al_2O_3 , Fe_2O_3 and MgO) with silica corresponds to primary magmatic characteristics through alkali oxides suggests elemental mobility and post-crystallization alteration effects. REE patterns depict high enrichment (~28-48 times chondrite) with fractionated values of $[(La/Yb)_N=3-5]$ and $[(La/Sm)_N=2-3]$ and $[(Gd/Yb)_N=1-2]$ coupled with prominent negative Eu anomalies, suggest a varying degree of partial melting and plagioclase fractionation. Primitive mantle normalized spider diagram shows enrichment of incompatible trace elements with depletion in Ba, Nb, and P, Ti and prominent positive Pb anomaly, indicating crustal derived melt being involved in the source. These A-type granites are formed in A2 affinity in an anorogenic to the post-collisional environment.

Keywords: Geochemistry, Petrogenesis, A-type Granite, Gavilgarh-Tan Shear Zone (GTSZ), central India