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PETROLOGICAL AND GEOCHEMICAL CHARACTERISTICS OF PEGMATITES FROM NARNAUL AREA OF DELHI SUPER GROUP ROCKS, NORTHERN PENINSULAR INDIA, HARYANA, INDIA

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Abstract

Metasedimentary rocks of the Delhi Supergroup (900-1600 Ma) are exposed in the Narnaul area of southern Haryana. Various rocks types of quartzite, schist, granitic gneiss, basic rocks, phyllite, slate, granite, pegmatite and veins of quartz are encountered in the area. Most of the pegmatites of the study area intruded into quartzite but minor amount of pegmatites are also intruded within the granitic gneiss, granite, schist and basic rock. Pegmatites occur as irregular masses, dyke swarms, branching dykes, criss-cross veins and elongated lenses. Their dimensions are variable ranging from 0.5 m - 250 m length and 0.5 - 100 m width. Narnaul pegmatites consist of quartz (smoky, milky, yellowish brown, buff), orthoclase, albite, biotite, muscovite, tourmaline, calcite, beryl, garnet, hornblende and natrolite in the decreasing order of abundance. These pegmatites are characterized by the presence of normative corundum; high contents of SiO_2 (73.6-76.23 wt. %), Al_2O_3 (13.87-16.03 wt. %), A/CNK (1.37-1.97) and Rb (131.06-603.45 ppm); low contents of CaO (0.2-1.41wt. %) and Sr (3.68-80.72 ppm). These distinctive features, along with their strong depletion in high field strength elements (HFSE; Zr, Nb, Hf, Ta, Ti, U, Th), suggest their affinity to peraluminous S-type granite generated by the partial melting of crustal material. Their geochemical characteristics also suggest that these pegmatites are suitable for the exploration of rare metals particularly Sn-mineralization and rare earth elements. These pegmatites are low heat producing granitoids because of their low content of radioactive elements (U, Th, K) (avg. 0.848 ìWm-3). The total heat generation unit (2.03 HGU) of these pegmatites is much lower than the average value of continental crust (3.8 HGU). The observed low thermal gradients assemblages coupled with a wall rock temperature are supporting the pegmatite emplacement within the amphibolite facies metamorphic terranes of Aravalli mountain belt in the Narnaul area of southern Haryana.

Keywords: Geochemistry, Mineralization, Pegmatite, Narnaul, Delhi Supergroup.