Petrography and Geochemistry of post-collisional adakites and Nb-enriched basalts association in the Sang-e-Rahuzg area (south of Birjand)

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Abstract

The studied rocks consist of Paleogene units with andesite and dacite composition and basaltic lavas belong to the Neogene time. Acid and intermediate lavas have medium to high-K calc alkaline nature and basalt is alkaline. Geochemical evidences show enrichment of LILEs relative to HFSEs in all volcanic rocks of Sang-e-Rahuzg area. Lack of negative Eu anomaly, low HREE (e.g. Yb= 0.67 - 1.62 ppm and Y=7.4 - 17.3 ppm), high Sr content (347.1 - 1010 ppm) and high Sr/Y ratio (31.84-99.99) indicate that the acid and intermediate rocks of Sang-e-Rahuzg area have adakitic nature. Moreover, high SiO_2 content (56.65-68.48 wt.%), $CaO+ Na_2O$ (7.57-10.47 wt.%) and Sr show that the rocks studied are classified as high-SiO_2 adakites. Also, high K_2O content (1.22-3.14wt.%), and high K_2O/Na_2O ratio (0.4-0.8) in compare with high-SiO_2 adakites document that these rocks belong to post-collisional adakite type. Low HREE content (YbN<8 ppm) and Y/Yb ratio (10-11.59), suggest that garnet is residual phase in their source. Furthermore, high TiO_2 (1.52 wt.%), Nb (14.9 ppm), Nb/La (0.43) as well as high HFSE content of the basaltic samples of Sang-e-Rahuzg are characteristics of Nb-enriched basalts. Partial melting of metasomatised mantle by adakitic melts, caused suitable conditions for generation of Nb-enriched basalt. All lavas of Sang-e-Rahuzg area were generated, as the result of collision of Lut and Afghan blocks during the Paleogene to the Neogene time, in post-collisional tectonic environment, result of collision of Lut and Afghan blocks in Paleogene to Neogene.

Key words: adakite, Nb-enriched basalt, post collision, Sang-e-Rahuzg, Lut block

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