Petrography and geochemistry of the Kahrizbeyg intrusion, southwest of Zanjan

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Abstract: The Kahrizbeyg pluton is located northwest of Iran in Central Iran zone. It is emplaced into the Cretaceous limestones in which contact metamorphism has happened. Meanwhile, rock fragments of this pluton are found in conglomerate units of Early Oligocene Lower Red Formation. Therefore, the relative age of pluton is between Cretaceous and Oligocene. The Kahrizbeyg pluton consists of granite and granodiorite which granodiorite is the dominant rock type. Major rock forming minerals of this pluton are quartz, plagioclase and K-feldspar along with mafic minerals of biotite and amphibole and accessory minerals of sphene, apatite and opaque minerals. Chlorite and calcite are also present as secondary minerals. Sieve texture, sphene ocellar texture, mafic clots, amphibole reaction rim around biotite and bladed biotite crystals are the textural characteristics of this pluton which have been probably generated by magma mixing in the study rocks. Abundant mafic microgranular enclaves in some parts of the Kahrizbeyg pluton also support this idea. Chondrite normalized REE patterns of the study rocks are relatively smooth and show enrichment in LREEs relative to HREEs. LREEs enrichment is due to low degree of partial melting, high abundance of these elements in the source or crustal contamination. In the spider diagrams, LILEs such as Rb, Th and K and some of the LREEs show enrichment relative to HFSEs like Yb, Sm, Zr, Ta and Nb. Positive anomalies of the elements Rb, Th and K are due to the magma mixing between crustal and mantle magmas or crustal contamination. The negative anomalies of Ti and Nb-Ta are characteristic to the subduction related magmatism. Also it can be due to lack of these elements in the source or crustal involvement in the magmatic processes. Based on petrography and geochemistry, the Kahrizbeyg pluton is a metaluminous, calc-alkaline, I type granite which has been generated in the active continental margin setting due to the subduction of Neotethys oceanic lithosphere beneath the Central Iran microcontinent.

Keywords: I-type granitoid; magmatic arc; magma mixing; Kahrizbeyg; Zanjan.

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