

## Changing of major, trace and rare earth elements in alteration zones of porphyry copper mineralization of Homond area (South Khorasan, Iran)

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**Abstract:** The Homond Cu-Au porphyry prospecting area is located southwest of Birjand. Subvolcanic monzonitic to dioritic rocks are highly altered. The main alteration zones are: quartz-sericite-calcite-pyrite, propylitic and carbonate. The content of major, trace and rare earth elements (REE) of the rocks changes due to alteration. The changes are less in some such as TiO<sub>2</sub>, MnO, P<sub>2</sub>O<sub>5</sub>, Nb, Gd, Y, Eu and higher in SiO<sub>2</sub>, K<sub>2</sub>O, Na<sub>2</sub>O, CaO, Al<sub>2</sub>O<sub>3</sub>, MgO, TFeO, Ba, Sr, Rb, Zr, Hf and most of REE. The chemical and mineralogical composition of the rock, type and intensity of the alteration control the changes. Quartz-sericite-calcite-pyrite alteration made the following changes in monzonite and diorite. The content of SiO<sub>2</sub> and Al<sub>2</sub>O<sub>3</sub> has increased and the amount of K<sub>2</sub>O, Na<sub>2</sub>O, TFeO and MgO are decreased. The changes in CaO content are being control by the amount of calcite. REE elements are usually lowered. Rb show different behavior in different intensity. Ba, Sr and Zr are highly depleted. With increasing the intensity of alteration, the content of Hf has depleted in monzonite and enriched in diorite. In propylitic alteration zone, the amount of SiO<sub>2</sub>, K<sub>2</sub>O and TFeO are decreased in both monzonite and diorite. The content of Al<sub>2</sub>O<sub>3</sub> and Na<sub>2</sub>O are decreased and CaO and MgO are increased in monzonite but in diorite are vice versa. REE elements are enriched in monzonite and depleted in diorite. Rb shows different behavior with different intensity of alteration. Ba, Sr and Zr are highly depleted. Hf shows enrichment both in monzonite and diorite. The chemical composition of monzonitic rocks within carbonate zone show depletion in SiO<sub>2</sub>, K<sub>2</sub>O, Na<sub>2</sub>O, MgO, TFeO, Rb, Sr, Ba, Zr and Hf and increase in CaO and Al<sub>2</sub>O<sub>3</sub>. REE elements are slightly decreased. Chemical composition of the rocks changes with alteration, therefore classification of the igneous rocks based on their chemical composition, rock series, Al-index (Shand) and REE pattern, can be affected. Finding the source of igneous rocks, based on Rb-Sr in altered rock, can be misleading. Therefore, it is important to select the right rock for studying the petrogenesis and radiogenic isotopes in altered areas.

**Keywords:** *Alteration; changing of elements; rare earth elements; porphyry copper; Homond.*

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