Petrology and fluid inclusion studies in Kahang porphyry copper deposit

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Abstract: Kahang porphyry copper deposit is located in Isfahan Province, in the middle of Urmia-Dokhtar Magmatic Belt. Based on field investigations and petrography of thin sections and core samples, igneous rocks in eastern part of the deposit are divided into three types of host-rocks, source and mineralizing rocks, and post-mineralizing barren dikes. Quartzdiorite has formed more than 70 percent of the main mineralizing stock. Geochemistry of volcanic and plutonic rocks shows that these rocks have formed from a single Calk-Alkaline magma that has produced various igneous rocks by differential crystallization. With increasing Si oxide, Na\(_2\)O and K\(_2\)O linearly increase, and FeO, MgO, CaO, P\(_2\)O\(_5\), Al\(_2\)O\(_3\) and TiO\(_2\) linearly decrease. Trace elements including Rb, Th, Ba and La, as well, with increasing SiO\(_2\), linearly increase, Sc, Yb, Ni and Y decrease, and Ce has a constant trend. The main alteration types in the deposit are Potassic, Phyllic, Quartz-Sericite, Propylitic, and Argillic. Biotite is the major product of potassic alteration, and hydrothermal alkali feldspar could only be observed in depths greater than 730 meter. Fluid inclusion studies on mineralized quartz veins in Potassic zone confirm that Cl-bearing saline fluids have carried Cu, and porphyry mineralization has formed in a temperature, pressure and depth of about 415 °C, 340 bars, and 1.3 km, respectively. Boiling and fluid cooling in A2 and B veins are the main controlling factors in precipitation of chalcopyrite in Kahang PCD.

Keywords: Urmia-Dokhtar; porphyry copper; kahang; petrology; fluid inclusion.