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Hydrothermal alteration and mineralization in Abdar Caldera, Kerman province, Iran

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The Abdar Caldera is located in 35 km northeast of Shaher-e-Babak, southeast of Iran. This area is geologically a part of northwest of the Dehaj-Sardueih Belt (a part of Uromieh-Dokhtar magmatic arc) that consists of a thick sequence of Eocene volcanic, pyroclastic and volcanoclastic rocks and Oligo-Miocene intrusions. Post-collisional processes also produced adakitic and alkaline rocks in this zone during the Plio-Pleistocene and Plio-Quaternary. Local geology consists of Eocene fine-grained tuffs, andesitic tuff, andesite, andesitic basalt, trachyandesite and basalt, and Oligo-Miocene, diorite and granodiorite. The above rocks are mainly porphyry in texture and contain plagioclase, K-feldspar, quartz, biotite and hornblende and minor titanite, magnetite, apatite and zircon. The volcanic and pyroclastic rocks were cut by numerous quartz veins in the area. Every vein surrounded by an intense alteration halo. The quartz veins show banding and comb structures in their central part where contains large (up to 3 cm) pyramidal quartz. The quartz crystals decrease in size outward. Phyllic and propylitic alterations occur at the periphery of the veins. Although hydrothermal alterations occur around the veins in a vast area but the veins are weakly mineralized. Most of the assemblages and fluid inclusions can be assigned to epithermal alteration and mineralization. Mineralization occurs as sulfides and oxides. The sulfides are pyrite, galena, sphalerite, chalcopyrite, stibnite, tetrahedrite, tennantite, arsenopyrite and covellite. The oxides are hematite, magnetite, pyrolusite and iron hydroxides. The gangue minerals are mainly quartz, barite, calcite and phyllosilicates. In this paper we document and interpret petrography and geochemistry of volcanic rocks using microscopic and XRF data. Alteration mineralogy checked by XRD. Sulfide and oxide minerals were analyzed by EPMA and the mineral chemistry will be discussed in this paper.

Keywords: Abdar Caldera, Oligo-Miocene intrusions, porphyry copper, hydrothermal alteration, Iran