



Geochemical element mobility during the hydrothermal alteration in the Tepeoba porphyry Cu-Mo-Au deposits at Balikesir, NW Turkey

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The Tepeoba porphyry Cu-Mo-Au deposit represents one of the important copper source and mineral deposits in the Anatolian tectonic belt at Balikesir province, NW Turkey. It is considered as a vein-type deposit locally associated with intense hydrothermal alteration within the brecciation, quartz stockwork veining, and brittle fracture zones in the main host rock that is represented by hornfels, as well as generally related to the shallow intermediate to silicic intrusive Eybek pluton. Based on the field and geologic relationships and types of ore mineral assemblages and the accompanied alteration types, there are two mineralization zones; hypogene (primary) and oxidation/supergene zones are observed associated with three alteration zones; potassic, phyllic, and propylitic zones related to this porphyry deposit. The phyllic and propylitic alterations locally surrounded the potassic alteration. The ore minerals related to the hypogene zone are represented by mostly chalcopyrite, Molybdenite, and pyrite with subordinate amounts of marcasite, enargite, and gold. On the other hand they include mainly cuprite with chalcopyrite, pyrite and gold as well as hematite and goethite at the oxidation/supergene zone.

This study deals with the quantitative calculations of the mass/volume changes (gains and losses) of the major and trace elements during the different episodes of alteration in this porphyry deposit. These mass balance data reveal that the potassic alteration zone is the main Cu- and Mo-enriched zone, has enrichment of K, Si, Fe, and Mg, and depletion of Na referring to replacement of plagioclase and amphibole by K-feldspar, sericite and biotite. While the propylitic alteration that is the main Mo- and Au-enriched zone is accompanied with K and Na depletion with enrichment of Si, Fe, Mg, and Ca forming chlorite, epidote, carbonate and pyrite. On the other hand the phyllic alteration that occurred in the outer part around the potassic alteration, characterized by less amount of Cu and Mo mineralization having addition of Si and K with removal of Fe, Mg, Ca, and Na.

Keywords: Mass balance calculation; Tepeoba porphyry Cu-Mo-Au deposits; Balikesir; Turkey