



## **Geochemical behavior of rare earth elements of the hydrothermal alterations within the Tepeoba porphyry Cu-Mo-Au deposits at Balikesir, NW Turkey**

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This work reports the geochemical characteristics and behavior of the rare earth elements (REE) of the hydrothermal alteration of the Tepeoba porphyry Cu-Mo-Au deposit located in the Anatolian tectonic belt at Biga peninsula (Locally Balikesir province), NW Turkey. The Cu-Mo-Au mineralization at this deposit hosted in the hornfels rocks and related to the silicic to intermediate intrusion of Eybek pluton. It locally formed with brecciated zones and quartz vein stockworks, as well as the brittle fracture zones associated with intense hydrothermal alteration. Three main alteration zones with gradual boundaries formed in the mine area in the hornfels rock that represents the host rock, along that contact the Eybek pluton; potassic, propylitic and phyllic alteration zones. The potassic alteration zone that formed at the center having high amount of Cu-sulfide minerals contains biotite, muscovite, and sericite with less amount of K-feldspar and associated with tourmalinization alteration. The propylitic alteration surrounds the potassic alteration having high amount of Mo and Au and contains chlorite, albite, epidote, calcite and pyrite. The phyllic alteration zone also surrounds the potassic alteration containing quartz, sericite and pyrite minerals. Based on the REE characteristics and content and when we correlate the Alteration index (AI) with the light REEs and heavy REEs of each alteration zone, it concluded that the light REEs decrease and heavy REEs increase during the alteration processes. The relationships between K<sub>2</sub>O index with Eu/Eu\* and Sr/Sr\* reveals a positive correlation in the potassic and phyllic alteration zones and a negative correlation in the propylitic alteration zone. This refers to the hydrothermal solution which is responsible for the studied porphyry deposits and associated potassic and phyllic alterations has a positive Eu and Sr anomaly as well as these elements were added to the altered rock from the hydrothermal solution.

**Keywords:** Rare earth elements geochemistry; Tepeoba porphyry Cu-Mo-Au deposits; Balikesir; Turkey