



## RARE EARTH ELEMENTS GEOCHEMISTRY OF THE HYDROTHERMAL ALTERATIONS ASSOCIATED WITH THE INTRUSION RELATED GOLD DEPOSITS AT ATUD AREA, EGYPT

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**Abstract:** This study deals with the geochemical behavior of the rare earth elements (REE) of the hydrothermal alterations that associated with the Vein-type gold deposits at Atud area, Central Eastern Desert of Egypt. This deposit is one of the intrusion related gold deposits in Egypt that is related to the metagabbro-diorite complex of GabalAtud. The mineralization is closely occurred in the quartz veins and intense hydrothermal alteration along the NW-SE brittle-ductile shear zone in the mine area. The accompanied hydrothermal alterations are mainly sericitization/kaolinitization and sulfidation with pervasive carbonatization, silicification, and chloritization, are distributed in three zones with gradual boundaries. The REE geochemical features of the least altered metagabbro-diorite rocks show enrichments in light REE, and practically flat heavy REE with slight positive Eu anomalies and Sr anomalies based on their chondrite-, N-type MORB, and primitive mantle-normalized REE patterns. On the other hand, the REE geochemical characteristics of the hydrothermal altered rocks from all zones of alterations reveal negative Eu and Sr anomalies suggesting that these elements (Eu and Sr) were leaching during the hydrothermal alteration processes. The relationships between K<sub>2</sub>O index with LREE, HREE, Eu/Eu\*, and Sr/Sr\* shows that there is a positive correlation with the LREE, fair correlation with HREE, and negative with Eu/Eu\* and Sr/Sr\*. This refers to that La and K were added to the rocks from hydrothermal solution responsible for the gold mineralization, that represented by sericitization alteration.

**Key words:** REE geochemistry; Intrusion related gold deposit; Atud area; Egypt.

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