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Alteration-Mineralization and Element Migration Features of Baiyinchang VMS Deposit in Gansu Province, China

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Abstract: Baiyinchang copper polymetallic ore district, located at the North Qilian metallogenic belt, is one of the most important volcanogenic massive sulfide (VMS) Cu-Pb-Zn-Au-Ag ore concentration area in China. It is hosted by Ordovician quartz-keratophyre tuff. The hydrothermal alterations are well developed in this copper-polymetallic deposit, including chloritization, sericitization, silicification, baratization and epidotization. Among them, chloritization and sericitization are widespread and the mineralization can be classified spatially into chloritization zone and sericitization zone respectively. In this paper, sampling of unweathered rock have been analyzed for major, REE and ore-forming elements from altered rocks and unaltered rocks. The aim is to reveal the relationship between alteration mineralogy and elements migration. Results show that : (1) the major elements migrated obviously from unaltered host rocks, chloritization belt to sericitization belt, indicating the hydrothermal fluid contained abundant of Fe₂O₃, MgO, SiO₂, and involved CaO, Na₂O, MnO₂ moved away; (2) The REE curves present a right dipping REE pattern, LREE is enrichment and LREE fractionation is significantly higher than HREE. The result of migration shows that the REE fractionation occurred in alteration-mineralization process and increased gradually from chloritization zone to sericitization zone. (3) The REE distribution patterns show that altered rocks are similar with unaltered rocks, indicating major metallogenetic materials came from magmatic-hydrothermal system of altered rock cylinder, and it was probably involved seawater. (4) The enrichment and losses elements are basic similarity in chloritization and sericitization, the enrichment or losses extent of chloritization zone are slightly higher than the sericite zone, show that alteration intensity is gradually increased from the outside to inside in altered rock cylinder. The chloritization and sericitization formed around the surrounding rock, which occurred metasomatic alteration in hydrothermal passage and controlled by hydrothermal convection on the seabed, it may serve as an indicator of ore-forming fluid deposition and has great significance for the depth-portion and periphery-portion prospecting.

Key word: VMS deposits; wall-rock alteration; element migration; Baiyinchang ore deposit, Gansu Province

