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安徽池州铜山铜矿床元素地球化学分带特征及意义

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摘要:

铜山铜矿是长江中下游成矿带内安庆-贵池矿集区中的一个中型矽卡岩型矿床,矿体赋存于铜山岩体与下二叠统栖霞组碳酸盐岩间的接触带内。典型剖面系统取样分析结果显示:从岩浆岩、矽卡岩到碳酸盐岩,元素地球化学组成总体上表现为渐变分带特征,即靠近岩体的矽卡岩富集Si、Fe、Mg及亲铁元素Co和亲铜元素Cu、Ag; 远离岩体的矽卡岩富集Ca、Mn、Al、Ti、REE和亲铜元素Pb、Zn; 远离大理岩带的强硅化蚀变岩富集Si、Fe、Li和Co,而强烈亏损Ca、Sr和REE。这种分带可以依据元素活化迁移理论加以解释。在矽卡岩形成过程中,岩浆热液携带Si、Fe、Mg、Al、Li、REE、大离子亲石元素Rb、Cs、亲铁亲铜元素Co、V、Zn以及高场强元素Ta、Zr、Nb、Hf、Ga、Be向大理岩迁移并富集于形成的矽卡岩中; 大理岩中的Ca被活化后进入矽卡岩体系,而Sr、K及Pb则随流体搬运迁出。蚀变及矿化较弱的矽卡岩稀土总量较高( $\Sigma\text{REE}=122.0\times 10^{-6}$ ),LREE富集 $[(\text{La}/\text{Sm})_N=3.99]$ ,HREE亏损 $[(\text{Gd}/\text{Yb})_N=2.85]$ ,Eu显示负异常( $\delta\text{Eu}=0.69$ )。重稀土配分形式与新鲜石英二长斑岩相似,但La、Ce等轻稀土元素相对亏损。矽卡岩剖面元素分带特征及稀土配分模式指示铜山矽卡岩铜矿床为接触交代成因。结合已有氢氧同位素结果,认为铜山铜矿成矿流体主要来自岩浆热液,在矽卡岩退化蚀变和成矿期间有大气降水混入成矿流体。

英文摘要:

The Tongshan copper deposit is a medium-sized skarn deposit, which is located in the Anqing-Guichi ore concentration area along the Middle and Lower Yangtze River metallogenic belt. Ore bodies occur in the contact zone between the Tongshan intrusion and carbonate of the Qixia Formation of the Lower Permian series. Element analyses of the samples systematically collected along a typical section show zoning with gradual variation in elements from magmatic rocks through skarns to carbonates. Skarns near the intrusion are rich in Si, Fe, Mg, siderophile element Co, chalcophile elements Cu and Ag, while those far from the intrusion are rich in Ca, Mn, Al, Ti, REE, chalcophile elements Pb and Zn. Strongly silicated rock far from the marble zone is enriched in Si, Fe, Li and Co, but strongly depleted in Ca, Sr and REE. This zoning may be explained based on the element remobilization theory. During the formation of skarns, Si, Fe, Mg, Al, Li, REE, LILEs (e.g., Rb and Cs), siderophile elements (Co and V), chalcophile element Zn, and HFSEs (e.g., Ta, Zr, Nb, Hf, Ga and Be) carried by magmatic-hydrothermal fluids might be transferred into the marble and enriched in skarns, while Ca in the marble activated and enriched in skarns, with moving out of Sr, K and Pb. Weakly altered and mineralized skarn is enriched in REE ( $\Sigma\text{REE}=122.0\times 10^{-6}$ ), especially LREE  $[(\text{La}/\text{Sm})_N=3.99]$ , but depleted in HREE  $[(\text{Gd}/\text{Yb})_N=2.85]$ , with a negative Eu anomaly ( $\delta\text{Eu}=0.69$ ). Chondrite-normalized HREE pattern of skarn is similar to that of fresh quartz-monzonite-porphyry, but it is relative low in LREE (e.g., La, Ce). The variation of elements along the section and REE pattern of skarns indicate a contact metasomatic origin of the Tongshan skarn copper deposit. The data mentioned above combined with H-O isotopic analyses indicate the derivation of ore-forming fluids is mainly from magmatic hydrothermal solution, with addition of meteoric water into the fluids at the stage of retrogressive alteration and mineralization.

关键词: [元素地球化学分带](#) [矽卡岩成因](#) [元素迁移](#) [热液交代](#) [安徽铜山铜矿](#)

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