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内蒙古车户沟钼铜矿成矿年代学及成矿流体特征研究

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摘要:

内蒙古车户沟斑岩钼铜矿床位于西拉木伦钼矿带内。含矿花岗斑岩的LA-ICP-MS锆石U-Pb年龄为 251.6 ± 3.2 Ma, 9件辉钼矿样品Re-Os同位素等时线年龄为 250.2 ± 7.2 Ma, 表明成矿作用发生在早三叠世。车户沟钼铜矿床成矿流体演化可分为矿前阶段、早阶段、中阶段和晚阶段。矿前阶段以斑晶石英+磁铁矿为标志, 流体以高温、低盐度、富 CO_2 为特征; 早阶段是辉钼矿沉淀的主要阶段, 流体包裹体均一温度分布范围为 $210 \sim 423$ °C, 盐度范围为 $5.3\% \sim 45.8\%$ NaCleqv, 部分不同类型不同盐度的包裹体密切共生, 但均一温度接近, 指示沸腾作用发生; 中阶段为黄铜矿沉淀的主要阶段, 未见含 CO_2 包裹体, 流体包裹体均一温度为 $210 \sim 391$ °C, 盐度范围为 $1.7\% \sim 43.8\%$ NaCleqv; 晚阶段为石英-碳酸盐±黄铁矿脉, 只发育富液相水溶液包裹体, 均一温度低于 260 °C, 盐度为 $2.4\% \sim 11.4\%$ NaCleqv。因此, 车户沟矿床成矿流体由初始的高温、富 CO_2 , 经沸腾作用和 CO_2 逃逸, 演化为低温、贫 CO_2 。车户沟氢氧同位素特征早阶段流体($\delta^{18}\text{O}_{\text{H}_2\text{O}} = 5.1\% \sim 5.7\%$, $\delta\text{D}_{\text{H}_2\text{O}} = -91\% \sim -88\%$)属于岩浆热液, 中、晚阶段($\delta^{18}\text{O}_{\text{H}_2\text{O}} = -5.1\% \sim -4.2\%$, $\delta\text{D}_{\text{H}_2\text{O}} = -105\% \sim -84\%$)介于岩浆水和大气降水之间, 指示成矿过程中有大气降水加入。

英文摘要:

The Chehugou Mo-Cu deposit is a porphyry Mo-Cu deposit, which is located in the Xilamulun Mo-metallogenic belt, Inner Mongolia. Re-Os isotope dating for nine molybdenite samples gives an isochron age of 250.2 ± 7.2 Ma, which is in accordance with ore-bearing granite porphyry LA-ICP-MS zircon U-Pb age of 251.6 ± 3.2 Ma, indicating that the deposit formed in the Early Triassic Epoch. The evolution of ore-forming fluids includes four stages, namely, the pre-ore, early, middle and late stages. The pre-ore stage fluids, forming the mineral assemblages of quartz phenocryst and magnetite, are characterized by high temperature, CO_2 -rich and low salinity. The early stage is conducive to molybdenite formation. Fluid inclusions in quartzs of this stage are homogenized at temperatures of 210 °C to 423 °C, with salinities of 5.3% to 45.9% NaCleqv, and some of them show contrasting salinities but similar homogenization temperatures, implying for fluid boiling process. The middle stage is remarkable for Cu mineralization, and fluid inclusions trapped in this stage are CO_2 -free, with homogenization temperatures of 210 °C to 391 °C and salinities of 1.7% to 43.8% NaCleqv, respectively. The late stage is characterized by quartz-carbonate±pyrite veinlets which only contain liquid-rich aqueous fluid inclusions homogenized at temperatures below 260 °C, with salinities ranging from 2.4% to 11.4% NaCleqv. Hence we conclude that the fluids were originally high temperature and CO_2 -rich, but evolved to low temperature and CO_2 -poor, through fluid boiling and CO_2 -release in the early stage. The H-O isotope systematics of the fluids in the early stage ($\delta^{18}\text{O}_{\text{H}_2\text{O}} = 5.1\% \sim 5.7\%$, $\delta\text{D}_{\text{H}_2\text{O}} = -91\% \sim -88\%$) are close to magmatic fluid, but in the middle and late stages ($\delta^{18}\text{O}_{\text{H}_2\text{O}} = -5.1\% \sim -4.2\%$, $\delta\text{D}_{\text{H}_2\text{O}} = -105\% \sim -84\%$) are between the magmatic and the meteoric water, suggesting a significant involvement of meteoric water.

关键词: [锆石U-Pb年龄](#) [Re-Os等时线年龄](#) [流体包裹体](#) [氢氧同位素](#) [车户沟钼铜矿床](#)

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