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湖南黄沙坪多金属矿床流体包裹体研究

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摘要：

黄沙坪多金属矿床位于南岭中段的湘东南地区，成矿斑岩主要为石英斑岩和花岗斑岩，其中钨钼矿体主要形成于岩体与碳酸盐岩接触带的矽卡岩中，铅锌矿体形成于矽卡岩外围，以及碳酸盐岩地层内的破碎带中。黄沙坪多金属矿床的成矿过程可以分为与钨钼成矿有关的矽卡岩期和与锌铅（钼）成矿有关的硫化物期。早矽卡岩阶段的石榴石和阳起石中包裹体均一温度为528～>600℃，普遍发育含石盐子晶包裹体（盐度达40%～45.5% NaCleqv）和低盐度（3.06%～4.65% NaCleqv）富气相包裹体，表现出流体不混溶现象。该阶段的流体压力大致为600～800bar，在静岩压力条件下，对应深度2.2～3.0km。晚矽卡岩阶段，白钨矿中流体包裹体以高温高盐度流体为特征，成矿温度为400～460℃，盐度为40%～45% NaCleqv，是沸腾作用下发生沉淀的，估算的流体压力大致为200～400bar，相当于静岩压力条件下0.7～1.5km的深度。而该阶段紫色萤石中流体包裹体发育以石盐子晶消失而达到均一的高盐度流体包裹体，其均一温度介于250～303℃，对应盐度介于34.7%～40.6% NaCleqv之间，估算得其最低捕获压力介于1500～2000bar。金属硫化物期，与Mo矿化有关的含辉钼矿石英脉中石英流体包裹体主要以富气相和富液相包裹体共存为特征，温度范围较一致（300～340℃），而盐度变化范围很大（5.86%～16.24% NaCleqv），显示流体的沸腾作用。与Zn-Pb矿化有关的萤石中几乎全部发育Type Ia富液相包裹体，流体沸腾作用不明显，温度集中在240～160℃，盐度范围大（0.88%～16.58% NaCleqv），表明该阶段成矿流体已演变为中低温、低盐度性质的流体。成矿流体包裹体研究表明，黄沙坪多金属矿床W-Mo-Pb-Zn矿床的形成是早期高温高盐度流体向低温低盐度流体演化的产物，在成矿过程中，流体发生了多次的沸腾作用。

英文摘要：

Huangshaping W-Mo-Pb-Zn polymetallic deposit is located in southeastern Hunan Province, South China. The mineralizations are associated with granite porphyry and quartz porphyry. Tungsten-molybdenum ore bodies occur as disseminated ore in skarn between quartz porphyry and carbonate rocks, while lead-zinc sulfide ores occur as veins outward the skarn, or within carbonate country rocks. The mineralization process can be generally divided into two stages. Skarn stage is associated with W-Mo mineralization and sulfide stage is associated with Pb-Zn mineralization. The fluid inclusions in garnet and actinolite are characterized by coexisting brine and vapor-rich fluid inclusions, indicating an immiscible condition. Using the homogenization temperatures (528℃ to >600℃) and salinity of brine (40%～45.5% NaCleqv), trapping pressure can be estimated to be 600～800bars, equivalent to a depth of 2.2～3.2km. Tungsten mineralization from later skarn stage was formed under boiling condition, characterized by fluid inclusion with high temperature (400～460℃), high salinity (40%～45% NaCleqv). The pressure is estimated to be 200～400bar, equivalent to a depth of 0.7～1.5km. At the sulfide stage, vapor-rich, liquid-rich and CO_2-rich inclusions from quartz are coexisting in molybdenite-bearing quartz vein, indicating boiling at narrow range of temperatures from 300～340℃ and wide range of salinity from 5.86%～16.24% NaCleqv. The fluid inclusions in fluorite associated with Zn-Pb mineralization are almost liquid-rich fluid, indicating fluid boiling is not obvious. During Zn-Pb mineralization stage, the ore-forming temperature drops to 240～160℃ and salinity shows a wide range from 0.88% to 16.58% NaCleqv, indicating the characteristic of low-medium temperature and low salinity of ore-forming fluid. We concluded that the W-Mo-Pb-Zn mineralization in Huangshaping deposit is related to the cooling and boiling of fluids from early high-temperature, high salinity to late low-temperature, low salinity.

关键词：流体包裹体 流体作用与演化 矽卡岩型多金属矿床 湖南黄沙坪

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