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黑龙江省多宝山斑岩型铜（钼）矿床成矿流体特征及演化

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摘要：

黑龙江省多宝山斑岩铜(钼)矿床位于小兴安岭西北部,是中亚-兴蒙造山带北东段最大的斑岩型铜(钼)矿床,矿体产于加里东期花岗闪长岩和中奥陶世多宝山组安山岩、凝灰岩中。铜矿化与绢英岩化关系密切,而钼矿化主要产于钾硅化带中。矿区内脉体广泛发育,从早到晚依次为: 石英+钾长石脉、早阶段石英+辉钼矿脉、晚阶段石英+辉钼矿脉、石英+黄铜矿+黄铁矿脉、石英+黄铁矿脉和方解石+石英脉。脉石英中广泛发育流体包裹体,包括气液两相水溶液包裹体(W型)、纯气相包裹体(G型)、含CO_2三相包裹体(C型)及含子矿物多相包裹体(S型)。石英+钾长石脉中仅发育气液两相包裹体,均一温度峰值＞550℃、盐度为16.2%~18.1% NaCleqv; 早阶段石英+辉钼矿脉中发育大量气液两相包裹体和含子矿物多相包裹体,并见少量含CO_2三相包裹体,均一温度集中在350~450℃、盐度变化于1.1%~＞65.3% NaCleqv; 晚阶段石英+辉钼矿脉体发育大量含CO_2三相包裹体和含子矿物多相包裹体,另有少量气液两相包裹体,均一温度集中在270~350℃、盐度为0.8%~42.4% NaCleqv; 石英+黄铜矿+黄铁矿脉中发育丰富的气液两相包裹体,见少量含子矿物多相包裹体、含CO_2三相包裹体和纯气相包裹体,均一温度峰值在230~330℃、盐度为0.8%~42.4% NaCleqv; 石英+黄铁矿脉和方解石+石英脉中仅发育气液两相包裹体,均一温度变化于110~200℃、盐度为3.9%~8.4% NaCleqv。成矿流体在古深度4.1km左右,温度在230~450℃之间、压力在10~41MPa之间,发生了强烈的流体沸腾作用,大量CO_2等气体从流体中释放出来,黄铜矿、斑铜矿和辉钼矿等巨量沉淀下来,形成了铜(钼)矿体。成矿流体总体上属H_2O-CO_2-NaCl体系,多期次的流体沸腾作用是该矿床的主要成矿机制。

英文摘要：

The large-sized Duobaoshan porphyry Cu (Mo) deposit, located in the northwestern part of Lesser Hinggan Range, is the biggest porphyry Cu (Mo) deposit in the northeast section of Central Asian-Mongolian-Hinggan orogenic belt. Its orebodies are mainly hosted in Caledonian granodiorite and Middle Ordovician Duobaoshan Formation andesite and tuff. Copper mineralization is closely associated with silicification and sericitization, and molybdenum mineralization occurs mainly in silicification-potassic feldspathization zone. Six main types of veins have been identified, namely quartz-potassic feldspar vein, early stage quartz-molybdenite vein, late stage quartz-molybdenite vein, quartz-chalcopyrite-pyrite vein, quartz-pyrite vein and calcite-quartz vein. Four types of fluid inclusions are distinguished from various quartz veins, i. e. aqueous two-phase (W-type), pure vapor-phase (G-type), CO_2-bearing three-phase (C-type) and daughter mineral-bearing multiphase (S-type) inclusions. Fluid inclusions of the quartz-potassic feldspar vein are mainly aqueous two-phase inclusions, their homogenization temperatures and salinities vary >550℃ and from 16.2% to 18.1% NaCl equivalent, respectively. Fluid inclusions of the early stage quartz-molybdenite vein are mainly composed of aqueous two-phase and daughter mineral-bearing multiphase inclusions with minor CO_2-bearing three-phase inclusions, their homogenization temperatures and salinities vary from 350℃ to 450℃ and from 1.1% to 65.3% NaCl equivalent, respectively. Fluid inclusions of late stage quartz-molybdenite vein consist mainly of CO_2-bearing three-phase and daughter mineral-bearing multiphase inclusions with minor aqueous two-phase inclusions, their homogenization temperatures and salinities vary from 270℃ to 350℃ and from 0.8% to 42.4% NaCl equivalent, respectively. Fluid inclusions of quartz-chalcopyrite-pyrite vein are mainly aqueous two-phase inclusions with minor CO_2-bearing three-phase, daughter mineral-bearing multiphase and pure vapor inclusions, their homogenization temperatures and salinities vary from 230℃ to 330℃ and from 0.8% to 42.4% NaCl equivalent, respectively. Fluid inclusions of the quartz-pyrite vein and calcite-quartz vein are characterized by aqueous two-phase inclusions, with homogenization temperatures of 110℃ to 200℃ and salinities of 3.9% to 8.4% NaCl equivalent, respectively. When the ore-forming fluid with temperatures of 230℃ to 450℃ and pressures of 10MPa to 41MPa ascended up to 4.1km, boiling action of ore-forming fluid occurred intensively, inducing a lot of CO_2 escape from this fluid. As solubility of ore-forming fluid abruptly depressed, this process resulted in abundant chalcopyrite, bornite and molybdenite deposited, forming Cu (Mo) ore body. The ore-forming fluid generally belongs to H_2O-CO_2-NaCl fluid system, and the multi-stages boiling action of ore-forming fluid is the dominant factor for metallic sulfide deposition.

关键词：流体包裹体 沸腾作用 多宝山斑岩铜(钼)矿床 黑龙江省 小兴安岭

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