FLUID EVOLUTION OF Fe-W AND POLYMETALLIC MINERALIZATIONS IN THE ULSAN MINE, KOREA

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The iron-tungsten and polymetallic mineralizations at Ulsan mine are located in Cretaceous volcano-sedimentary terrain at the southeastern border of the Korean peninsula, and consist of calcic skarn and vein deposits in crystalline limestone near Tertiary epizonal granite stock. After the iso-chemical contact metamorphism, the skarnoid in stage I was formed, which consists of anhydrous Ca-Al-Mg skarn minerals at the contact between granite and crystalline limestone. A main prograde metasomatic process (stage II) is characterized by the earlier development of prominent magnetite with Ca-Fe-Al-Mg skarn minerals and skarn calcite, and the later deposition of Ni-Fe arsenides and sulfarsenides with quartz. A retrograde skarn (stage III) is characterized by the early occurrences of minor scheelite impregnation in calcite and quartz with actinolite and chlorite and late polymetallic Cu-Zn sulfide mineralization. Stage IV is characterized by Zn-Pb-Ag mineralization in siderite-quartz veins. Fluid inclusion results and arsenopyrite compositions indicate the successively evolutionary trend from hypersaline magmatic fluids (361¡Æ to 559¡ÆC, 32.9 to 45.1 wt % NaCl) in the prograde skarn stage to low-salinity and low-temperature fluids (156¡Æ to 425¡ÆC and salinities of 1.8 to 24.4 equiv. wt % NaCl) in the retrograde skarn stage. As the magmatic-derived fluids continues to wane, surficial fluids descend to deeper levels along fractures, and this results in low-temperature siderite-quartz deposition and Zn-Pb-Ag mineralization (234¡Æ to 352¡ÆC, 2.6 to 10.5 equiv. wt % NaCl). Decreasing As contents of arsenopyrite from stage II (35.4 atomic % As) to stage IV (30.3 atomic % As) indicates a decrease in temperature and/or sulfur fugacity (from 10-6 to 10-10 bars) with time. These results for Ulsan deposit provide the possibility of the skarn deposit genetically related to low sufidation porphyry systems.