A Discovery of Daughter Minerals in Fluid Inclusions of Taibai Gold Deposit , Shaanxi Province, China

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Much progress in the study of daughter minerals in fluid inclusions has been made during recent years, but rarely about daughter minerals in fluid inclusions of hydrothermal gold deposits have been reported. Taibai gold deposit is a unique breccia-centment gold-bearing system, occurring in Devonian strata of Southern Qinling mountains. The breccia zone strikes NWW-SEE. The cement is mainly composed of ankerite, pyrite, calcite and quartz, which may be divided into four main tectonic-mineralization stages. Gold mainly occurs in pyrite and ankerite of stage II, III and IV. Three kinds of fluid inclusions in ankerite and quartz of main mineralization stages can be distinguished — aqueous inclusions, CO_2-rich inclusions , and daughter minerals-containing inclusions. LRM analyses shows that CO_2 contents occupy 54.4~70.7 mol% in vapor phases of different fluid inclusions. H_2O, CH_4 (5.2~7.3mol%) and H_2S (6.0~12.7mol%) exist in both vapor and liquid phases; CO and SO_2 are also detected in some samples. Many daughter minerals in fluid inclusions of ankerite and quartz have been found. Several kinds of daughter minerals, including ankerite, pyrite, arsenopyrite and halite, were determined by using SEM/EDS technique. EPMA technique was also applied to study the daughter minerals. Stable isotope studies of ankerite and quartz show that the $\delta^{18}O$ values of ankerite vary from 17.55 to 19.64 per mil. The calculated $\delta^{18}O$ of fluid inclusions may change from 8.32 to 15.20 per mil. The ankerite $\delta^{13}C_{PDB}$ values are from -5.20 to -6.74 per mil. It may be concluded that the water in the hydrothermal fluids during main gold mineralizing stages could have been a mantle source, but local meteoric water might have been important in late mineralization, because of lower δD .In summary, characteristic of Taibai gold deposit is different from either lode gold deposits in Archean greenstone terrains or the Carling-type gold deposits, not only because of geological features but also ore-forming fluids.