

2.5.P05

The Rb-Sr, Sm-Nd isotopic systematics of the Gaojiapuzi Ag deposit, NE China

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The Gaojiapuzi large Ag deposit is located at the Liaodong Paleoproterozoic rift zone, Northeast China, and is hosted by the Proterozoic marble. Two types of ores occurred in the deposit are the massive Pb-Zn-Ag ore and the silver ore distributed in the fractured marble cemented by quartz and dolomite veins. We have performed Rb-Sr and Sm-Nd analyses for 9 ankerites, step-leaching analyses (two steps: 0.2 mol/L HCl leaches powder and HCl+HNO₃ dissolves the residues) of Rb-Sr for 9 pyrites and one parargyrite and the same step-leaching analyses of Sm-Nd for 2 pyrites from the deposit.

The ankerites show low ⁸⁷Rb/⁸⁶Sr of about 0.006, but high ⁸⁷Sr/⁸⁶Sr ranging from 0.72586 to 0.72808, ¹⁴⁷Sm/¹⁴⁴Nd from 0.1462 to 0.1724 and ¹⁴³Nd/¹⁴⁴Nd from 0.51150 to 0.51161. Rb and Sr are concentrated in the 0.2 mol/L HCl leachates for sulfides and possibly contained in the fluid inclusions. The leachates of 0.2 mol/L HCl from 8 pyrites show ⁸⁷Rb/⁸⁶Sr of 0.013 to 0.078 and ⁸⁷Sr/⁸⁶Sr of 0.72152 to 0.72358. The 0.2 mol/L HCl leachates of one pyrite and one parargyrite from one same sample give higher ⁸⁷Rb/⁸⁶Sr of 0.357 and 0.255 and lowest ⁸⁷Sr/⁸⁶Sr of 0.72018 and 0.71129. Sr concentrations are too low in the residues (aqua regia soluble) to obtain precise ⁸⁷Sr/⁸⁶Sr ratios. The 0.2 mol/L HCl leachates of the two pyrites show higher ¹⁴⁷Sm/¹⁴⁴Nd of 0.210 and 0.169 and ¹⁴³Nd/¹⁴⁴Nd of 0.51187 to 0.51166 than the ankerites. The corresponding residues have ¹⁴⁷Sm/¹⁴⁴Nd of 0.0365 and 0.0972 and ¹⁴³Nd/¹⁴⁴Nd of 0.51141 and 0.51149. Because of the low ⁸⁷Rb/⁸⁶Sr ratios, the ⁸⁷Sr/⁸⁶Sr ratios of the ankerites and all 0.2 mol/L HCl leachates can represent the initial ratios of the parent hydrothermal fluids. The ankerites show the highest initial ⁸⁷Sr/⁸⁶Sr, pyrites leachates intermediate and the parargyrite leachates the lowest initial ⁸⁷Sr/⁸⁶Sr. That probably implies the isotopic variation of the hydrothermal fluid during mineralization.

The 0.2 mol/L HCl leachates and residues of the 2 pyrites give Sm-Nd isochron ages of about 600 Ma which are significantly different with the Rb-Sr age of 233±14 Ma given by Xue et al. (2003)^[1], suggesting a state of disequilibrium for the Sm-Nd isotope system in the hydrothermal fluid inclusions and the sulfide crystal lattice.

References

- [1] Xue C.J., Chen Y.Q., Lu Y.F. and Li H.Q. (date) *Mineral Deposits* **22**, 177-194. (in Chinese with English abstract)

2.5.P06

Origin of the banded ores in the sandstone of the Lubin-Siroshovice Cu-Ag deposit (Fore-Sudetic Monocline, Poland)

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The Lubin-Siroshovice deposit is the largest of the stratiform red-bed associated Cu deposits found in Permian strata. The economic ores are placed over Carboniferous red terrigenous beds in the uppermost part of 30-40 m bed of gray sandstone, black shale and lowermost (up to 2-2.5 m) part of the Zehshtein limestones. The banded texture is one of the most widespread in the sandstone with economic Cu. A lot (up to 40-60) of 0.5-3 cm parallel zones of chalcocite cementing the sandstone represents the banding. The work presents the interpretation of these ore accumulation based on mineralogical observations and recalculations of the equations of linear diffusion and equilibrium constants. The bottom border of the bands is sharp and richest in ore, but upward the mineralization rapidly becomes sparser into barren bands. The distance between bands is almost constant, but between some lowest bands increases down. The shape of chalcocite bands indicates that Cu⁺ compounds diffused upward and reacted with H₂S⁻ saturating the environment during decomposition of organic matter in black shale and sandstone. The sharp bottom border of the bands above "empty" zone characterizes a high diffusive mobility of Cu⁺ bottom-up and relative passivity of H₂S⁻ ions (or slow diffusion of methane, producing H₂S⁻ during reaction with SO₄²⁻) diffused down. The gradation into thinning disseminated mineralization upward in the each zone testifies to the decreasing content of diffused Cu⁺ spending for Cu₂S crystallization. In another way, disseminated mineralization was a buffer for H₂S⁻ ions diffused down. Consequently, the reduction of the content of H₂S⁻ ions led to the intensification of Cu⁺ diffusion upward to the place of sufficient content of H₂S⁻ to produce new Cu₂S band (Fig.).

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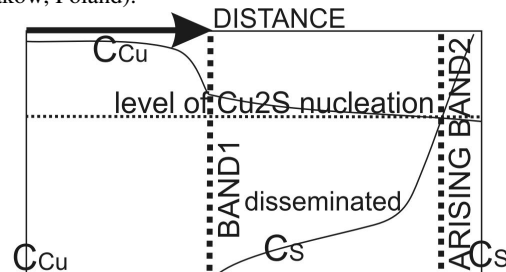


Fig. The variations of total concentrations (C) of H₂S and Cu⁺ at the arising of new chalcocite band.