Constraints from fluid inclusions and S-H-O isotope systematics: Songliang vein-type Pb-Zn deposit in northeastern Yunnan, China

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The Songliang vein-type Pb-Zn deposit is a representative deposit in the western Yangtze Craton, which contains a total metal reserves of 28,5000 t Pb and Zn, with an average grades of 10.52% Zn and 0.92% Pb, respectively. There're just a few of investigations have been carried on the geological background of the lead-zinc deposits formation, ore type and mineral composition in this area. Whereas the vein-type lead-zinc deposit formed in Dengying Formation of the Upper Sinian has not been fully studied, the origin of deposit and the metallogenic processes remained uncertainty. Therefore, in this study, fluid inclusions and S, H and O isotope systematics were utilized to trace the ore-forming fluids effect and ore-forming material sources of this kind of deposit.

Based on experiment and test, the following conclusions are obtained:

1. The homogenization temperatures of these Fls are from 105.4 to 238.9 ℃, mainly in the range of 140.0 to 160.0 ℃, with calculated salinities of 8.70 to 19.29 wt.% and calculated density of 0.926 to 1.064 g/cm^3. The metallogenic depth is in the range of 735 to 1668m.

2. The sulfur isotopic composition of nine samples derived from galena and sphalerite in the primary ore of the Songliang lead-zinc deposit were determined. Sulfides have $\delta^{34}S_{CDT}$ values range from +6.5 to +13.9 ‰, with an average of +11.1‰, similar to the MVT. Sulfide minerals from the sample showed δ^{34}S sphalerite$>\delta^{34}$S galena.

3. H-O isotopes compositions of fluid inclusion in quartz from the Songliang Pb-Zn deposit were shown that Quartz has $\delta^{18}O_{H2O}$ and δD values ranged from -0.9 to +4.65 ‰ (SMOW) and from -89.1 to -75.0‰ (SMOW), respectively. The data of hydrogen and oxygen isotopes has a trend of drifting to the meteoric water line, suggesting that water should originated from the atmospheric precipitation.