

Occurrence and distribution of organic sulfur, silver in organic matter of the Songxi Ag-Sb deposit, South China

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The organic sulfur and silver contents of individual organic matter in host rocks of the Songxi shale-hosted Ag-Sb deposit of eastern Guangdong region, South China, has been directly determined using the electron microprobe technique. This study shows that the data analyzed by electron probe are authentic. Silver contents in individual organic matter generally contains high silver, and the data obtained by using electron probe are basically in range from 100ppm to 350ppm. The average silver content of organic matter is several times higher than the tenor of silver of the Songxi Ag-Sb deposit. The silver content of organic matter has enormously increased as compared with the source rock, and the silver enrichment coefficients vary from 11 to as high as 2100. Another interesting phenomenon is that there is significant difference in silver contents between the marine vitrinite and solid bitumen. Within a single thin section, the solid bitumen generally contains an increasing silver about 10ppm as compared with the marine vitrinite. The average values of silver content in the solid bitumen and marine vitrinite from all samples analyzed are 215ppm and 175ppm, respectively. The organic sulfur data analyzed by electron microprobe from both marine vitrinite and solid bitumen are basically in range from 1.0 to 3.50%, the average organic S content up to 1.53%. Microprobe analysis of S allows one to map the distribution of S within individual macerals and within individual samples, to confirm that the S does not occur as finely disseminated inorganic sulfides. Back-scattered electron and X-ray imaging demonstrate that the S associated with organic matter does not occur as pyrrite. These images indicate that the S is distributed through the macerals homogeneously. Only S K α peak are observed in wavelength dispersive spectra of organic matter, no metals are observed. Scanning electron micrographs of organic matter show that there is no existence of microscopic inclusions of silver minerals within the organic matter. Qualitative chemical composition X-ray scanning analysis by electron probe from the surface to core of organic matter also indicates that the distribution of both silver and organic sulfur within organic matter is uniform and dispersive. Therefore, we may conclude that the chemisorption (complexation) and reduction of organic matter are the main way that causes the anomalous silver enrichment.