Occurrence of Silver, Sources of Mineralized Substances and Ore-Forming Mechanism of Yinchangpo Silver-Polymetallic Deposit , Guizhou province, China

Abstract

The geologic and geochemical characteristics, the occurrence of silver, the sources of mineralized substances, the features of ore-forming fluids and the ore-forming mechanism have been comprehensively studied through a series of researches on the petrology and lithogeochemistry, the mineralogy,the fluid inclusion, the rare earth elements and trace elements, the isotopes of lead, strontium, sulfur, carbon and oxygen for Yinchangpo silver-polymetallic deposit. In addition, the degree and direction of immigration of silver and other ingredients during the process of the wall rock alteration are calculated quantificationally on the basis of determining TiO_2 as an immobile ingredient. Finally, the metallogenic model has been established,and the exploration criteria have been suggested. The major achievements of this paper are listed as follow:

1 It is suggesting for the first time that the deposit of Yinchangpo is a silver polymetallic deposit moreover,we have studied the geologic and geochemical characteristics, the occurrence of silver, the sources of mineralized substances and mineralization machanism of the deposit.

2. The characteristics of silver minerals and the occurrences of silver are studied in detail for the first time by the methods of optical microscope and EPMA.Six silver minerals, including natural silver, acanthite, Freibergite, polybasite, cerargyrite and argentojarosite, are identified. Silver predominantly occurs in galena as a form of silver minerals.

3. it is suggested for the first time that The BaiZuo Group is one of sources of mineralized substances.Since the sedimentary environment of BaiZuo Group in Yinchangpo ore district belongs to laguna subfacies and tidal flat faces of restricted platform, and it is favourable for depositing plentiful ore-forming substances derived from Kangdian old land. Accordingly the stratum of BaiZuo Group is one of important source in the studied district.

4. The metallogenic substances were derived from multiple source area. The istopic characteristics of Pb and Sr indicate that the major metallogenic substances (Ag, Pb, Zn) of Yinchangpo silver-polymetallic deposit may come from the carbonate rock in Baizuo Group of early Carboniferious period and Kunyang Group of Yangtzee craton's basement. In addition, the ore-forming fluids can also extract a small amount of metallogenic elements from other strata in its ascending process.

5. The research on isope of S and C indicates that sulfur ,as an important precipitator of silver, mainly comes from the wall rocks(Carbonate rocks of BaiZuo Group) of the ore bodies.The calcites intergrowthed with sulphides in ore are products of carbonate rocks' dissolution of BaiZuo Group ,it is obvious that the wall rock has paticipated in the reaction of fluid and rock.
6. The contribution of E'meishan basalt during the ore-forming process in Yinchangpo ore district is confirmed. The geochemical characteristics of REEs and the isotopes of Pb, Sr and S show that the E'meishan basalt may be not the source of ore-forming substances.
7. The characteristics of fluid inclusions suggest that the ore-forming fluid is a kind of low temperature, low salinity and Cl-rich hydrothermal system, Ag, Pb and Zn were transported as a form of Cl-complex.
8. On the basis of determining TiO_2 as immobile ingredient ,The feature of ingredients' imigration during the alteration of wall rock are caculated. The results indicate that the imigration of ingredient is not so obvious during the process of silver's preliminary enrichment,Ag,Pb and Zn were brought into wall rocks;while during the process of silver's second enrichment ,CaO and MgO were taken away from the wall rock, since CaO and MgO were leaching away strongly, a large amount of ingredient including REE,tracements and oxides were enriched, therefore, the loss of volume of rock leads to the result of caculation of mass balance indicating a false appearance that most ingredients were brought into the wall rock.
9. The mineralization machanism of Yinchangpo silver-polymetallic deposit have been established for the first time, The deposit is considered to be an low salinity ,low temperature hydrothermal deposit.The orientation and signals of exploring silver deposits are put forward on the basis of geological and geochemical characteristics of Yinchangpo silver-polymetallic deposit and other Ag-rich sulfide deposits. Which are shown as follow : the wide spreading dolomite, the positive anomalies of Ag, Pb, Zn, As, Sb, Cd, Ga and Ge,aleration of low temperature,such as dolomitization and calcitization, the vicinity of second faults closed to large deep fauits,the axes of anticlines, the interbedded fracture belts.

Keywords: *silver-polymetallic deposit, Occurrence of silver , Metallogenic source, Ore-forming mechanism, Yinchangpo*