

# Physical Chemistry Study on the Ore-forming Process of the Hetaoping Pb-Zn-polymetallic Deposit, Baoshan County, Yunnan Province, China\*

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The Hetaoping Pb-Zn-polymetallic deposit occurring in the northern-middle section of the Lancangjiang tectonic-metallogenetic belt, is a new type Pb-Zn-Cu-Ag-Au deposit. The stratified and vein orebodies exist in skarn and marbleization-limestone of the Upper Cambrian strata within the NS-trending interstrata faults. Mineralization consists of sphalerite, galena, chalcopyrite, pyrite, and minor magnetite. Gangue minerals consists of quartz, calcite, dolomite, diopside, actinolite, and zoisite. Alteration consists of skarnization, silicification, pyritization, carbonation, marbleization, and chloritization. The fluid inclusions studies of quartz and calcite show that the primary fluid inclusions can be classified into aqueous-rich two-phase type, pure aqueous type and minor CO<sub>2</sub>-bearing three-phase type, and the ore-forming solutions mainly belong to the NaCl-H<sub>2</sub>O-CO<sub>2</sub> type characterized by rich Cl<sup>-</sup>, SO<sub>4</sub><sup>2-</sup>, Na<sup>+</sup>, K<sup>+</sup>, CO<sub>2</sub>. Microthermometric studies indicate that the homogeneous temperatures, salinities and densities of the ore-forming solutions focus on the range of 95 to 320°C, 0.5% to 11.8% NaCl equiv, and 0.83 to 1.00 g/cm<sup>3</sup> respectively, and the pressures vary from 7.24 MPa to 58.99MPa. The  $\delta^{34}\text{S}$  values of sphalerite, galena and chalcopyrite collected from the ore bodies range from +0.99‰ to +10.17‰ with an average of +6.93‰. The <sup>206</sup>Pb/<sup>204</sup>Pb, <sup>207</sup>Pb/<sup>204</sup>Pb, and <sup>208</sup>Pb/<sup>204</sup>Pb ratios of sulfide ores centralize on the range of 18.224 to 18.338, 15.715 to 15.849, and 38.381 to 38.874 with the model ages of 405~509 Ma. The trace elements and rare earth elements of the fault tectonites and altered rocks analysed by ICP-MS indicate that the metallic mineralization is precisely controlled by NS-trending compresso-shear faults and NW-trending tensional-shear faults. All the evidences support that the deposit is a typical tectonic-skarn-bound hydrothermal deposit having multi-epochs, multi-stages and multi-sources.

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## References

[1] Chen Y.Q., et al. 2005. *Geology in China*, 32(1):90-99.