

Zinc isotopes in sphalerite from Weilasituo hydrothermal deposit in Da Hinggan Mountains, China

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There exists three types of deposits at Weilasituo in the Middle-southern Part of Da Hinggan Mountains, China. They are W-Sn porphyry type at western mine area, W-Sn-Mo breccia type at the middle and Cu-Pb-Zn vein type mineral systems at eastern. The sphalerite exists in three types of ore, so we can analyse the Zn isotopic composition. The results reveal a trend of increasing $\delta^{66}\text{Zn}$ values from west to east in the Weilasituo deposits and the highest $\delta^{66}\text{Zn}$ values can be observed in the eastern old deposit, also the lower $\delta^{66}\text{Zn}$ values can be observed at deeper levels and the higher $\delta^{66}\text{Zn}$ values exist at upper levels from the same borehole.

We conclude that the primary control on isotopic variation with the sphalerite $\delta^{66}\text{Zn}$ values is temperature gradient, instead of the source rock variation. The $\delta^{66}\text{Zn}$ values are inversely correlated with sphalerite Fe/Mn ratio and also tend to be higher in low In, Cd sphalerite, consistent with precipitation of lower $\delta^{66}\text{Zn}$ sphalerite closer to the principal hydrothermal fluid conduits. But the lowest Cd Leucocratic sphalerite (a sample) has the highest $\delta^{66}\text{Zn}$ values, whereas highest In and Bi are also enriched in it. It suggests that Leucocratic sphalerite which in the Weilasituo deposit could be formed in independent In-Zn(Cu)-Pb-Ag mineralization, and the W-Sn-In-Bi mineralizations in the Weilasituo deposit might form in same place but might come from different metallogenic fluids source.