Paper Number: 2793

Constraints from C-O isotope compositions on the origin of the Zhaxikang Zinc polymetallic deposit, Tibet, China

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Isotope geochemistry is a major part of the geochemistry of mineral deposits, it has paly a leading role in determination of mineral source, mineralization process, metallogenic evolution and crust-mantle interaction, so that to the origin of the deposit. Many researchers have done a preliminary work by isotopes from Zhaxikang deposit, which is located in the North Himalayan, south Tibet, China. It has a heated debate about its genesis. Based on these previous data, the main purpose of this easy is to discuss the various isotopes composition, the source of minerals and the genesis of Zhaxikang deposit.

Carbon and Oxygen isotope

Studying the carbon isotope is an effective way to tracing the source of ore-forming fluids and minerals. The carbon isotope usually combines with the oxygen isotope to determine ore-forming origin and evolution[1] .Although there are a large number of carbonate minerals in Zhaxikang deposit, but no graphite symbiosis with them, so the carbon isotopic composition of calcite can be approximated to be the total carbon isotope composition in the ore-forming fluids.

Li had taken carbon and oxygen isotope analysis from one early-stage dark-colored carbonate minerals, four late-stage white calcites and four slates from Ridang formation which is the main ore-bearing strata in Zhaxikang deposit[2]. According the $\delta^{13}C$-$\delta^{18}O$ diagram, the early–stage carbonate minerals ($\delta^{13}C_{V\text{-}PDB}$ = -6.6 ‰; $\delta^{18}O_{V\text{-}SMOW}$ = 12.7 ‰) has a similar carbon isotope composition with their counterparts in Lengshuikeng porphyry zinc-silver deposits ($\delta^{13}C_{V\text{-}PDB}$ = -4.8 ‰ ~ -5.5 ‰; $\delta^{18}O_{V\text{-}SMOW}$ = 12.6 ‰ ~ 14.1 ‰). They are all plotted in the range of low-temperature alteration of granite from the Zhaxikang and the Lengshuikeng[3], indicating that the ore-forming sources closely associated with granite alteration. The four slates from Ridang formation ($\delta^{13}C_{V\text{-}PDB}$ = -6.47 ‰ ~ -0.72 ‰;-$\delta^{18}O_{V\text{-}SMOW}$ = 19.86 ‰ ~ 21.44 ‰) mainly distribute in the area of the marine carbonate rocks and carbonate dissolution. It basically represents the marine carbonate strata.The four late-stage calcites ($\delta^{13}C_{V\text{-}PDB}$ = -3.5 ‰ ~ 0.9 ‰;-$\delta^{18}O_{V\text{-}SMOW}$ = 15.9 ‰ ~ 19.3 ‰) are plotted in the area between low-temperature alteration of granite and marine carbonate dissolution scope, indicating that carbon source of minerals may be the mixed results between strata and magma.

In summary, it can be concluded that mineralization of this deposit is related to magmatic hydrothermal activity, the ore-bearing marine strata may provide some substances during the mineralization process.

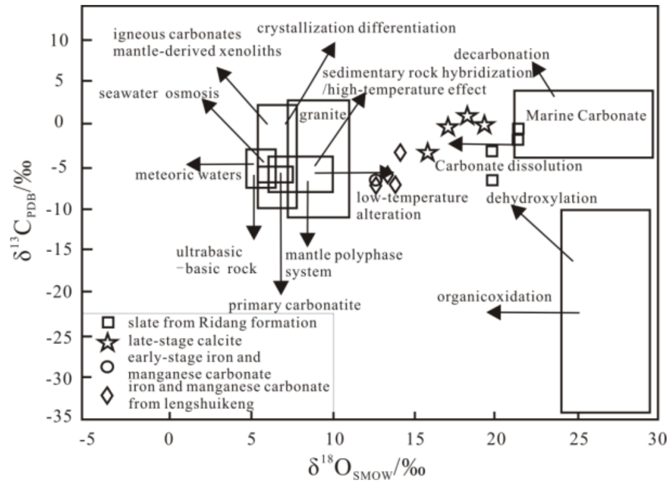

Fig.1. The δ13C-δ18O diagram of Zhaxikang deposit(data from Li, 2010 and Xiao etal,2014)

References

[1] Liu, J. J, etal., 2004.. Mineral deposits, 23(1): 1~10.

[2] Li G.Q., 2010. China University of Geosciences(Beijing).

[3] Xiao M. etal., 2014. Geology IN CHINA. 41(2): 589~601.