Origin of mineralizing fluid of Niujiaotang Cd-rich Zinc Deposit, Duyun, Guizhou, China

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Niujiaotang deposit is a Cd-rich zinc ore deposit with a total reserve of over 5000 tons of cadmium and the content of Cd in the ores is abnormally high (Lin Ye,2003), generally ranging from (2248-9850)×10^{-6}, with the maximum to 13400×10^{-6} (averageing 5366×10^{-6}), 5~6×10^{6} orders of magnitude higher than the Clarke value.

There are several evidences show that the mineralizing fluid was related with Maijiang paleo-oil pool: (1) The deposit is located at the south edge of Majiang paleo-oil pool. (2) There are much bitumen are founded in the ore deposit, which are hosted in the alga-bearing dolostones of the Lower Cambrian Qingxudong Formation and sphalerite ore. (3) The deposit is apparently rich in heavy sulfur isotopes, with $\delta^{34}S$ ranging from 18.40‰ to 26.87‰ (averaging 22.48‰) in a pyramid-fashion distribution, which is similar with $\delta^{34}S$ value of bitumen that occurs in Majiang paleo-oil pool, rang from 22.65‰ to 26.232‰. (4) Organic inclusions are founded in sphalerites, calcite and dolomites. (5) Our researching results show that this mineralizing fluid is a kind of Na^{+}-Ca^{2+}-Mg^{2+}-Cl^{-} system, which is similar to that of MVT deposit, but different in the temperature, salinity and density of mineralizing fluid. Except the higher in Ca^{2+} and Mg^{2+}, and the composition of mineralizing fluid are similar to those of oil-field brine (Ye Lin,2000).

Therefore, it is suggested that the mineralizing fluid of the deoposit possibly came from oil-field brine of Majiang paleo-oil pool. The mineralizing fluid, which contains higher SO_4^{2-} and Cl^{-}, was derved from oil-field brine, leached Cd and Zn etc. ore-forming elecments from stratum, alga-bearing dolostones of lower Cambrian Qingxudong formation, enriched and mineralized in the ore area.

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The geochemical characteristics of the ore-forming fluid of Dajishan tungsten deposit in south China

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The Dajishan tungsten deposit is located in the well-known Tungsten Province, Jiangxi, south China. The deposit contains a number of tungsten quartz veins occurring in precambrian lower grade metamorphic rocks and granites of Mesozoic age. Previous work revealed that it is a W-Sn-Nb-Ta polymetallic deposit. This paper concentrated in ore-forming fluid through study of the inclusions in quartz associated with ore bodies.

Our work shows that the anions of inclusions is of HCO_3^{-}-Cl^{-}- F^{-} type, containing 5.9~20.4 wt%HCO_3^{-}, 0.4~1.5wt%Cl^{-} 0.75~2.8wt%SO_4^{-} and 0.1~0.58wt%F^{-}. The cations K^{+}, Na^{+}, Ca^{2+}, Fe^{2+}, Mg^{2+} and W^{6+} are all found in the studied samples, the total cations sum from 1.98 to 12.44wt%, and the content of ore-forming element W^{6+} is very high, ranging from 0.2 wt% to 6.81wt%. It is notable that the high values of W^{6+} are correlated with high HCO_3^{-}. It is suggested that the HCO_3^{-} type fluid is responsible for tungsten transportation and enrichment.

Individual inclusions are determined by Laser Raman micro-spectrometry. The result shows that the main volatiles are CO_2, CH_4 and N_2, but they vary largely. CO_2 is dominated with X_{co2} of 43.78~100%. X_{CH4} is from 3.88% to 42.86%, and some samples contain N_2, with X_{N2} 13.3~19.52% across. According to the results, the inclusions can be classified into four types: I: CO_2+H_2O, II: CO_2+H_2O+ CH_4, III: CO_2+ H_2O+CH_4+N_2 and IV**:** H_2O. It represents that the fluid compositions vary largely, and that the ore-forming system was not stable. Furthermore, boiling inclusions and three-phase inclusions (with liquid CO_2 and/or halite daughter crystals) are also found in the deposit.

In addition, hydrogen and oxygen isotope study revealed that the δD_{snow} of the fluid inclusions range from –54.9‰~ -67.4‰ and $\delta^{18}O_{snow}$ from +9.8‰ ~+11.8‰, which suggest it's magmatic origin.

Based on the above results, it is proposed that the ore-forming fluid of the Dajishan tungsten deposit mainly derived from deep magma camber, CO_2 ,N_2 and CH_4 could be related to deep mantle degassing, and that the HCO_3^{-} type fluid may favorable to the transposition and accumulation of the ore-forming elements. The precipitation could be caused by fluid boiling process.