Geochemical characteristics of granitic rock mass of the NaChatang north skarn Pb - Zn deposit in Tibet

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1 Introduction

The NaChatang north mine is located in the eastern Gangdise lead zinc, copper, iron, polymetallic metallogenic belt. The area is closely related to the lead-zinc-copper deposits in the adjacent mining areas. The mineralization zoning has been found in the district with nearly 20 industrial deposits. The preliminary determination of the lead-zinc deposits for commercial exploitation, The Long MaLa deposit) (Xin, 2013; Fu, et al., 2014). In recent years, predecessors have studied the rock mass in the Gangdise metallogenic belt, but there are few studies on the rock mass in the mining area and the adjacent area. The southern part of the mining area is widely developed biotite granite, extending in the east-west direction; Part of the drilling are exposed to another set of granodiorite porphyry rock, and the boundaries are obvious, has not yet identified the mine two sets of rock and mineralization relationship is biotite granite? Or biotite granite porphyry? Based on the detailed field geological survey, the research work on the granite porphyry exposed to the granite rock and the exposed drilling of the lower working area in the southern part of the mining area is carried out. Chronological and geochemical studies to determine the diagenetic age, genesis and tectonic environment and mineralization of granite bodies, to determine the direction of ore prospecting, to provide a new breakthrough for prospecting for the mine and Gangdise metallogenic belt.

2 Geological survey of mining area

The lithology of the strata in the mining area is relatively simple, mainly the third lithologic section (C2P1l3) and the small Quaternary (Qh) of the Upper Carboniferous-Lower Permian. To the group of the whole layer of the east and west, respectively, tend to south, tilt angle of 50°–80°. (C2P1l3-1) quartz sandstone slate; the second sub-layer (C2P1l3-2) limestone clay dolomite, marble (1), the first sub-layer
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(C2P1l3-1) (C2P1l3-3) quartz sandstone section calcined sandstone; fourth sub-layer (C2P1l3-4) marble, limestone; fifth sub-layer (C2P1l3-5) sandstone clip rock, slate.

The magmatic activity in the mining area is dominated by late Yanshanian magmatic intrusion, mainly in the southwest and south of the mining area, showing near east and westward, and the length and width of the rock mass extend beyond the range of mineral rights. 1.5Km², over the fifth sub-layer above. Lithology is mainly biotite granite, in the mining part of the drilling in the exposed granodiorite porphyry, to be studied.

The main metal minerals are sphalerite, galena, chalcopyrite, pyrrhotite, pyrite, mirror iron ore, mineralization is mainly veins - striped - disseminated in the garnet-pyroxene Skarn; non-metallic minerals mainly skarn minerals, garnet, diopside, wollastonite, karst rock, crest, chlorite, hornblende, quartz, etc., the main ore alteration For the skarn, the roof of the petrochemical, angle rock.

3 Rock geochemical characteristics

3.1 Main element

There are some differences in the content of the main elements in the two kinds of rock mass in the mining area, and also have some similarity.

The content of SiO₂ in the biotite granite is 71.02%–71.81%, Al₂O₃ content is 13.45%–13.57%, TiO₂ content is 0.15%–0.21%, MgO content is 0.32%–0.38% Is 6.79%–7.47%, K₂O/Na₂O value is 1.89–2.00. The content of SiO₂ in the granodiorite porphyry is 65.17%–66.73%, Al₂O₃ content is 14.43%–15.20%, TiO₂ content is 0.62%–0.69% MgO content is 1.11%–1.20%, Total (Na₂O + K₂O) content is 6.55%–7.37% and K₂O/Na₂O value is 1.29–1.38. In the SiO₂-(Na₂O+K₂O) diagram, the projection of the sample component mainly falls on two different regions, The biotite granite falls in the granite area, and the granodiorite porphyry component projection point falls into the granodiorite area, which is stable and both belong to the subalenine series. The Ritman index δ= 2.53–3.28 <3.3 in the two types of rock mass, indicating that the granite bodies belong to calc and alkaline; The K₂O-SiO₂ diagram shows that both rocks show a series of high-K calc-alkaline. The A/CNK ratios of the biotite granite are (1.03–1.14)>1, A/NK value is (1.41–1.57)>1, belongs to the aluminum character; The A/CNK value of the granodiorite porphyry is 0.98–1.02, the average value is 0.99<1, the A/NK value is (1.50–1.66)>1, which belongs to the characteristics of quasi-aluminum-over aluminum transition. K₂O/Na₂O ratio is (1.29–2.00)>1. In the CIPW standard minerals, a small amount of corundum molecules are found in 8 samples, indicating that the granite belongs to quasi-aluminum-aluminous rocks.

Therefore, the data analysis of the granite body in the main area shows that the geochemical characteristics of the rocks belonging to the transitional rocks of high K, Na, high potassium calc-alkaline series and quasi-aluminum-over aluminum.

3.2 Rare earth elements

The two types of rock mass in the mining area have similar geochemical characteristics of rare earth elements, Through calculation we can see that the total ∑REE
(116.32–390.81) × 10^{-6}, with an average value of 250.45 × 10^{-6}, is much higher than that of the crustal magma 164 × 10^{-6}. From the rare earth element chondrites normalized distribution pattern can be seen that the granite body is characterized by light rare earth weak enrichment of the right tilt type, LREE/HREE ratio range of 9.84–13.82. Indicating that light and rare earth, heavy rare earth serious losses, you can determine the formation of rock when there have been varying degrees of differentiation. The δEu range is 0.60–0.94, showing the characteristics of europium loss, δCe value range of 0.88–0.93, showing a slight loss of the characteristics. The ratio of LaN/YbN is 14.79–24.99, which indicates that the rare earth elements in the granite body undergo a strong fractionation in the evolution. Therefore, the rare earth elements of the granite body show a significant negative Eu anomaly, and the overall fractionation is higher.

3.3 Trace element

Can be quantified by trace elements of trace elements to quantify the difference between the values to reflect the degree of magma crystallization and material sources (Li Changnian et al., 1992). It can be seen from the test data that the mass fraction of large ion lithophile elements (LIL) Sr, P and Ti are: (187.98–332.04) × 10^{-6}, (201.72–1158.35) × 10^{-6}, (869.90–5755.00) × 10^{-6}; The content of Nb in the high field strength (HFSE) is (20.61–67.48) × 10^{-6}. It can be seen that the granite body in the mining area shows the depletion of elements such as Nb, Sr, P, Ti and La and the characteristics of Nd and La enrichment.

References
