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The Curves of Seven REE and Their Geological Significances of Porphyry Mo (Cu) Deposit of Chengba, Tibet

SONG Xuebing¹, SHI Zeming^{1,2*}, ZHANG Kailiang¹, ZHANG Junji¹ and ZHU Feilin¹

¹ Chengdu University of Technology, Chengdu, 610059, China

² The Key Laboratory of Nuclear Techniques in Geosciences, Sichuan .Chengdu, 610059, China

1 The Regional Geological Background

The Chengba deposit adjacent to the Yarlung Zangbo suture zone is a porphyry deposit occurring at the southern edge of the eastern Gangdese metallogenic belt. The metallogenic element combinations in the Chengba deposit is Mo-Cu (Wang et al., 2014). This district is mainly located in Zedang region of the southeastern margin of the Gandese metallogenic belt, Aitchison based on the development of the area of Cretaceous tholeiitic and basalt andesite, which think the intra oceanic arc of new Tethys ocean subduction, accompanying by subduction of the Tethys ocean and collision between the Indian continental plate and the Asian plate collage in the southern margin of Lhasa block (Zhou et al., 2011).

2 The Characteristics of the Deposit

A variety of intrusion outcrop such as moyite, biotite monzogranite, granodiorite, porphyaceous

adamellite and granite porphyry. The moyite and granite porphyry are the ore-forming related intrusion which are completely mineralized. Wall rocks suffered a little extensive alteration, mainly as potassic, silicification, chloritization kaolinization and skarn alteration. Various types of alteration have the characteristics of vertical variations, and skarn formed where the intrusions interact with carbonate wall rocks, Potassic and silicification alteration occurred at deeper levels. Mineralization also shows vertical variation, Cu and W mineralization in skarn formed in the relatively shallow subsurface, and Mo (Cu) mineralization in porphyry occurred at larger depths (Zhou et al., 2011).

3 The Curves of Seven REE

REE has similar ionic radius and crystal chemical

properties, determining the features of their close symbiosis and common migration in nature; But their physical and chemical properties of tiny differences (alkaline, complexing ability, price and isomorphous substitution ability difference) often make them have some separation of various geological effects in the nature.

The curves of seven REE are based on the characteristics of REE and their distribution follows the Odd- Huggins law (atomic number of elements is even number, the concentration is greater than the odd element of the adjacent) and even rare earth elements with an odd number of elements and the similar proportions. This paper focuses on the analysis of rare earth elements of the intermediate-acidic intrusive rocks in the Chengba, summarizing the metallogenic characteristics and mineralization, discussing metallogenic model of porphyry deposit and its prospecting significance.

The curves of seven REE of the acidic intrusive rocks in Chengba can be seen (Figure 1) that the AB line length is greater than the BC line, namely, $ab/bc > 1$. That these kinds of lithology with rich features of LREE, $\sum Ce / \sum Y > 2$, namely, the curves of seven REE are L-type (Bai et al., 1993); By the AB line and BC line clockwise angle to express, figure 1 can be seen, the $\alpha < 180^\circ$, $Sm/Nd = 0.13 \sim 0.24$, $Dy/Er = 1.63 \sim 2.03$, Sm/Nd value less than Dy/Er , so the curves of seven REE belong to the La-type, indicating that the several granites are I-type granite.

On the whole, the curves of seven REE can more clearly show abundances characteristics and evolution trend of REE. First, the five curves are La type, indicating that the rocks have characteristics rich in light rare earth elements; Secondly, five curves are substantially parallel, and similar, indicating that the magma is associated with genesis and continuous evolution characteristic; Thirdly, from left to right, lithology evolves from granite porphyry, monzogranite to moyite, the curves gradually promote from the lower of

* Corresponding author. E-mail: 530295854@qq.com

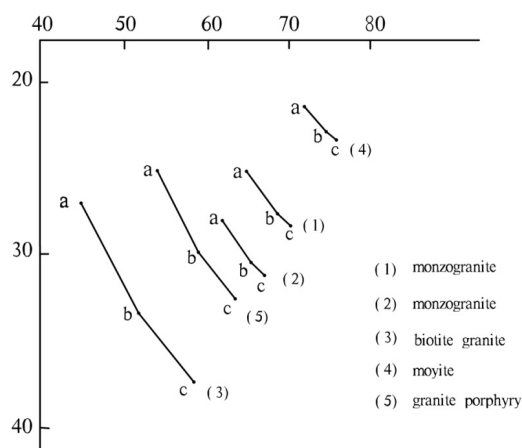


Fig. 1. The curves of seven REE.

left to above the right, indicating that magma has higher abundances of LREE with evolved magma, which may be related to zircon of HREE enriched mineral (Bai et al., 1993). Fourthly, the genetic type of rocks belongs to mixed type of crust-mantle, accessory minerals have an assemblage consisting of Fe-Ti oxide, apatite, zircon, monazite, bastnaesite, uraninite (Zhou et al., 2011), melaminerals are mainly biotite, a litter amphibole. These minerals except low content rare earth of Fe-Ti oxides belong to Lb-type, zircon belongs to Lc-type, the rest of relative enrichment in the LREE are La-type, so the rocks also show characteristics of La curve.

4 Conclusion

The curves of seven REE have the advantage of simple,

intuitive graphical method, clear, and effectively response to variations of REE and genetic features of rocks and minerals. and can be used as auxiliary means to solve some geological problems. The curve types of seven REE which significance is clearly useful in Earth Sciences, especially in determining the successions of intrusive, interpreting the genesis and evolution of magma as well as analyzing the process of mineralization. But as with other methods, it still has limitations and shortcomings, therefore, with the curves of seven REE and other graphics or characteristic parameters, and combined with data of geological, rock, mineral, petrochemistry, trace element, stable isotope, comprehensively analysis, in order to better understand the genesis and evolution characteristics of rocks and minerals and help to solve the geological problems.

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References

- Bai Zhiming, 1993. Types of seven-even-numbered curves and their geological significances. *Geosciences*, 7(2): 179-185.
- Wang Liqiang, Tang Juxing, Chen Wei, Luo Maochen 2014. Sulfur and Lead Isotopic Geochemistry of the Nuri and Chengba Cu-Mo-W Deposit in Tibet. *Acta Geoscientica Sinica*, 35(1): 39-48.
- Limin Zhou, Zengqian Hou, Yuanchuan Zheng, 2011. Study on accessory minerals in Yaja granite, northern Tibet:Indicator of the magma source. *Acta Petrologica Sinica*, 27(9): 2786-2794.