

A preliminary discussion on some important advances of the rare metal deposit

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Rare metal ore reserve is an important strategic resource, and its metallogenic mechanism studies have been received widespread attention. Here we presented briefly discussion focused on four aspects of recent progress, which include deposit types, relationship between the magmatic rocks, carbonate rocks and rare metal mineralization, metallogenic fluids and mineralization mechanism, and metallogenic chronology.

Rare metal deposits are major of granite type and granitic pegmatite type, with the geochemical composition of the ore-related rocks can effectively showing the metals mineralized trend. The ore-forming rocks (e.g., very high K/Ba, low K/Rb and Zr/Hf ratios, with REE tetrad effect) and its accessory minerals (e.g., zircon with high Th/U ratio (1~10), Y/Ho<20, Sm/Nd>0.5, Nb/Y>0.08, and Hf>2wt%) often show special geochemical characteristics. Fluid immiscibility was commonly existed in the rare metal deposits, especially in mineralization fluids of the granitic pegmatite-type deposits, and the mineralization experienced multiple phases from magma to hydrothermal phases. Fluid composition is more complex, in addition to B, F elements, recently rare carbonate minerals were discovered, which shows that its metallogenic mechanism worthy of further study. Geochronology of rock formation and mineralization often affected by many factors, such as Ar isotopic system completely reset when temperature exceeds Ar closed system due to the late dynamic and fluid action; or high U content, metamictization, multiple genesis and inheritance of zircons from the ore-forming rocks, etc. Therefore, the study about the geochronology needs combing consideration of appropriate analytical method and geological background.

Base on the understanding of the above advances in recent years, we propose that four aspects need further study in the future as follows: 1) relationship between the evolution of ore-forming rocks and the enrichment of ore-forming metal elements, and metallogenic specialization; 2) explore on migration, occurrence and precipitation conditions of rare metal elements, which can provide theoretical support for improvement of rare metal deposit mining technology; 3) study on the application and applicability of a variety of mineral isotopic dating methods in rare metal deposits; and 4) investigate of application of emerging technologies in exploration and evaluation in the rare metal deposits.