Geochemical Characteristics of Rare-Metal, Rare-Scattered, and Rare-Earth Elements in the Late Permian Coals from the Moxinpo Mine, Chongqing, China

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Coal deposits have attracted much attention as potential promising alternative raw sources for rare-metal, rare-scattered, and rare-earth elements (TRE), such as Li, Ga, U,Ge, and REY [1-4]. In this article, we report geochemical (abundance, enrichment, distribution, genesis, andmodes of the coexistence of TREs) and mineralogical data on Late Permian bituminous coals (No. K2) from the Moxinpo mine, Chongqing, China, and discuss possiblemechanisms to explain the joint enrichment of TREs.

Sample collection and analytical methods

Samples were collected from the working face of the underground K2 coal seam in the Moxinpo mine, and were analysed by proximate, X-ray diffraction (XRD), X-ray fluorescence spectrometry (XRF), and inductively coupled plasma mass spectrometry (ICP-MS).

Results and discussion

In the K2 coal, Nb and Re are significantly enriched, and Zr, Ta, Se, and Sc are enriched, whereas the remaining elements are slightly enriched. The spatial distribution of TREs in the K2 coal could be classified into three groups: Li−Be−Rb(Cs)−Sr−Ge−Se−Tl, Zr(Hf)−Nb(Ta)−Ga(In)−Te−Re−Cd, and REY−Sc assemblages. The REY enrichment type was identified as L-type and was deduced from the higher fractionation of light REEs than that of heavy REEs. The Al_2O_3/TiO_2 ratio also proves this source of terrigenous sediments for the K2 coal. Furthermore, the results suggest that the K2 coal was formed in seawater-transgressive environments. The correlation analysis showed that rare-metal and rare-earth elements in the K2 coal mainly occur in aluminosilicate minerals (Kaolinite), with traces of bastnäsite and xenotime, whereas the rare-scattered elements (Ge, Se, Cd, In, and Te) are hosted in sulfide minerals (pyrite).

[1] Sun et al. (2015) *Acta Geol. Sin.* **89**, 229−241. [2] Qin et al. (2015) *Earth-Sci. Rev.* **150**, 95−101. [3] Hower et al. (2016) *Minerals* **6**, 32. [4] Dai et al. (2016) *Int. J. Coal Geol.* 159, 82-95.