

The rare metal elements in the high aluminum coal of Jungar Coalfield, Northern China

CUNLIANG ZHAO¹, BANGJUN LIU², M. BLOKHIN³

¹ Key Laboratory of Resource Exploration Research of Hebei Province; Hebei University of Engineering, Guangmingnan Street 195, Handan, Hebei 056038, China. Zhaocunliang@hebeu.edu.cn

² Department of Environmental Analytical Chemistry, Institute of Atmospheric and Environmental Sciences, J. W. Goethe-University Frankfurt am Main, Altenhöferallee 1, 60438 Frankfurt am Main, Germany. bangjunliu@126.com

³ Far East Geological Institute, Far Eastern Branch of Russian Academy of Sciences, Vladivostok 690022, Russia. blohinstar@gmail.com

The average content of Al₂O₃ is 46.2% in the ash of No.6 coal, and the carriers of Al are kaolinite and boehmite. The plot of Li in ash against Al₂O₃ in ash shows a scattered positive correlation. Another plot of Li in ash against the SiO₂/Al₂O₃ ratio shows a relatively strong negative correlation, suggesting that the Li may be related to one or more of the Al-bearing phases. The kaolinite and chlorite-group minerals are the carriers of Li, and the contents of Li in boehmite, pyrite and calcite are very rare. The relation of Li with macerals shows that lithium concentration is mainly related to inorganic matter. The lithium content in the inertinite fraction is 7 times as it in the vitrinite fraction. The result of sequential chemical extraction indicated that the dominant Li exists in the silicates.

The distribution regularity of Li and Al₂O₃ is different because the boehmite is the main carrier mineral of Al but not Li. However, the distribution regularity of Ga, REY and Al₂O₃ is similar. Ga is enrichment in coals of the northwest, northeast, southeast and center parts in Jungar coalfield, and the characteristics of source area and local depositional environment control the content of Ga. The distribution of REY is similar with Al₂O₃ and Ga, the mineral of source area is the key factor which controls the content of REY in coal, and the leaching of groundwater causes the REY enriched in coal than parting.

The main origin of Al₂O₃, Li, Ga and REY are the strongly - peraluminous granite in Yinshan Oldland and the bauxite in Benxi Formation, and Lüliang Peninsula may also influence the sedimentation of the around areas.

Corresponding author: E-mail: zhaocunliang@hebeu.edu.cn