

Mineralogical and geochemical characteristics of No.15 coal from the Qinshui Basin of China: implications for Li enrichment

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Comprehensive information about the concentrations, distribution, and modes occurrence of elements in coal is important to understand the geological processes, economical utilization and environmental contamination or improvement. The latest data on coal petrology, mineralogy and coal geochemistry of the No.15 coal form Taiyuan Formation of Late Carboniferous, which sample from the Qinshui Basin, China was reported in this study. The results illustrate lithium (Li) is highly enriched with average value is 195.76 $\mu\text{g/g}$ and average concentration coefficient (CC) of 13.98 in comparison with world coals (14 $\mu\text{g/g}$). The mineral occurrence in No.15 coal is kaolinite, illite, chlorite, pyrite, marcasite, siderite, calcite, quartz, zircon, anatase and strontium phosphate. Li is mainly existence with aluminosilicates clay minerals. The enrichment of Li is mainly affected by the source-area composition, ocean and hydrothermal fluids. The coal seam is affected by the Fe-Mg-rich hydrothermal fluid after diagenesis, forming more chlorites that symbiotically with kaolinite, which is conducive to the enrichment of Li element.

During the high-temperature combustion process, Li has different levels of re-enrichment ability in the coal ash, and the enrichment ability of elements in coal is the largest, followed by carbonaceous mudstone and parting, the seam roof and floor is the weakest. After high-temperature combustion, Li is enriched again in coal with the enrichment factor of 6.69.

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