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Home ► All Journals ► Engineering & Technology ► International Journal of Coal Preparation and Utilization ► List of Issues ► Volume 42, Issue 4 ► Characterization of rare earth elements ....

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Research Article

# Characterization of rare earth elements by XRT sorting products of a South African coal seam

G. Akdogan 🕒, S. Bradshaw, C. Dorfling, C. Bergmann, T. Ghosh 🔀 & Q. Campbell Pages 1071-1087 | Received 25 Sep 2019, Accepted 23 Oct 2019, Published online: 11 Nov 2019 Check for updates 66 Cite this article ▶ https://doi.org/10.1080/19392699.2019.1685506



### **ABSTRACT**

Full Article

South Africa is an important participant in the global coal market. The four Upper coal seam situated in Springs-Witbank Coalfield was subjected to XRT sorting and subsequent mineralogical studies to characterize REE content. The average total REE content (LREE and HREE) of the coal were 280 ppm on ash basis. The surrounding elemental composition besides carbon primarily consisted of O, Si, S and Fe with minor quantities of Al, P and Ti. Major minerals, such as quartz, dolomite, illite, gypsum, siderite, pyrite correlated positively with ash content (r > 0.9) except kaolinite, and microcline, indicating incongruent source and formation mechanisms. Additionally, the HREEs Lu, Tm, Dy, Ho, Gd and Tb displayed strong correlations (r > 0.95) with ash content but were negatively associated with fixed carbon. Sc is negatively associated with coal ash. Fixed carbon is weakly associated with La but negatively associated with HREEs. La showed a weak association with Ce. Y is strongly correlated with HREE

elements especially with Dy, Tm, Lu and Ho while at the same time LREE are strongly associated with Ce, Pr, Nd, La, Eu but negatively with Sc and fixed carbon levels.

#### **KEYWORDS:**

Coal REE XRT sorting South Africa

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### Additional information

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