

Mineral matter of coal petrology

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Coal is composed of organic components or macerals with inorganic fractions. The organic components are fundamental in defining the nature of coal and almost all the benefits derived from coal, including its energy output on combustion, its role in metallurgical processing, its capacity for in-situ methane absorption, and its potential as an alternative hydrocarbon source, are derived essentially from the maceral constituents.

The inorganic fraction typically contributes little if anything to the value of the coal in these utilization activities. It leaves an ash residue when the coal is burned, or that needs to be removed as slag from the blast furnace during metallurgical processing. Except for issues related to greenhouse gas generation, most of the problems associated with coal utilization arise from the incorporated mineral matter, rather than directly from the maceral components. Therefore, researches of coal have been focusing on organic matters.

From the genetic point of view the mineral matter in coal, like the organic matter, is a product of the processes associated with peat accumulation and rank advance, as well as changes in subsurface fluids and other aspects of sediment diagenesis. Indeed, as suggested by Mackowsky (1968), the processes that form particular minerals and mineral associations are often better understood from other branches of the Earth sciences than the processes that form coal maceral components.

The inorganic fraction, generally classified as "mineral matter", encompasses all the minerals and other inorganic elements, such as: i) non-mineral inorganics, which include dissolved salts and other inorganic substances present in the pore water of coal, as well as inorganic elements incorporated within coal macerals; and ii) discrete inorganic particles (crystalline or non-crystalline) representing the mineral components (Suárez-Ruiz and Crelling, 2008; Vassilev and Tascón, 2003; Ward, 2002).

Knowledge of the mineral matter will be of assistance in understanding implications for assessing possible environmental impacts and the potential for recovery of economic products from coal.