

**MULTIANALYTICAL APPROACH TO CHARACTERIZE THE MINERALS ASSOCIATED TO COALS**

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**RESUMO:** The combination of Optical Microscopy (OM) with instrumental microscopic techniques like Electron Microscope (HR-TEM and SEM) coupled to Energy Dispersive X-Ray Spectroscopy (EDS), Confocal Microscopy (CM) and Micro-Raman Spectroscopy (MRS) applied on 31 coal samples from continents have demonstrated to be useful tools for the research of the mineralogical composition of coal samples. The analytical approach makes use of OM to select the different mineral phases associated to coal samples. Then the instrumental microscopic techniques are used on the selected targets. The SEM/EDS, HR-TEM/EDS and MRS analysis showed no significant differences in the chemical composition of the main minerals found associated to coal, such as Oxides, Sulphides, Sulphates, Silicates, Carbonates and others. Those techniques provide fast, non-destructive and highly-selective analysis of both the surface and the coal inner bulk. Moreover, thermodynamic speciation through chemical modelling simulations gives the required information to confirm the stability of secondary minerals detected in the samples and helps to diagnose the potential environmental risks associated to their weathering.

**PALAVRAS-CHAVE:** COAL MINERALS CHARACTERISATION; NON-DESTRUCTIVE TECHNIQUES; MULTIANALYTICAL APPROACH.