

71st Annual Meeting of the International Committee for
Coal and Organic Petrology



Book of Abstracts

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BOOK OF ABSTRACTS

SYMPOSIUM ON ORGANIC PETROLOGY WITH SPECIAL FOCUS ON OIL GENERATION FROM
COALS AND CARBONACEOUS SHALES

71st ANNUAL MEETING OF THE INTERNATIONAL COMMITTEE FOR COAL AND ORGANIC PETROLOGY

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Cover image:

Photomicrograph of blue-fluorescing oil inclusions in
Najmah Kerogene Fm., U. Jurassic, Kuwait
Oil immersion, UV light-excitation, width 600 μm .

COAL MINE DRAINAGE IN AN ABANDONED COAL MINE IN DOURO COALFIELD (PORTUGAL)

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The past coal mining activities in Douro Coalfield (NW Portugal) were developed in two principal mining areas, namely São Pedro da Cova and Pejão. The São Pedro da Cova abandoned coal mine operated for almost 200 years and the environmental legacy left by mining operations include negative impacts, among others, on water resources, affecting biodiversity and human health. The São Pedro da Cova mine is located near a population centre and social infrastructures, and it is surrounded by agricultural fields. Besides the leaching occurring in the São Pedro da Cova self-burning coal waste pile that may affect the soils, surface and ground waters. The water circulating inside the underground structures is being drained outside of the mine into a natural water stream.

This study presents the hydrogeochemical characterization of the São Pedro da Cova mine effluents through the analysis of water samples (with and without influence of mine drainage). The concentration of major ions, heavy metals and the priority polycyclic aromatic hydrocarbons (PAH) were determined. The chemical composition of the water drained from inside the mine were compared with the chemical composition of leaches produced through leaching test with the coal waste pile material.

The results indicate that the drainage waters present neutral to almost neutral pH, high electrical conductivity and high concentration of metals, with Al, Fe, As, Mn, and Ni having concentrations higher than values admitted for human consumption. The mine drainage waters present SO₄-Mg facies. The high concentration of metals and the hydrogeochemical facies of these effluents confirm the contamination of streams by mine effluents. Considering organic compounds, some priority PAH were detected in the drainage waters, with high percentage of low molecular weight PAH relatively to high molecular weight PAH, which is common for PAH with petrogenic source. This means that the PAH in the mine effluents result from water circulation through coaly materials inside the underground mining infrastructures. The impact of the use of this water for agricultural irrigation is insufficiently known, and the effect on human health should be investigated.

The water leachable fraction of the São Pedro da Cova mining residues presents higher leachable percentages of Ca, Cd, Co, Mg, Mn, Na, Ni, S, and Zn, indicating that these elements are partly associated with water soluble compounds, and that they are the most easily leached and accessible for percolation and mobilization. These elements were also detected in drainage waters, with some of them with high concentrations, such as the case of Mn and Ni that were found with values higher than those referred in the legislation for human consumption. The results demonstrate that the chemical composition of mine drainage waters discharged into a natural water stream reflects and is affected by the composition of the geological materials through which it percolates, mobilizing heavy metals and PAH to natural systems.

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