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Trace Elements in some Hungarian Brown Coals: Concentrations, Distributions and Bioavailability

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Trace elements, among others the heavy metals Cr, Mo, Ni, U, V and Zn were studied in the Ajka Upper Cretaceous and Dudar-Balinka Eocene brown coals in Transdanubia, Hungary. As regards to the concentration of the elements it is stated that some of them, e.g. V, U and Mo display unusual high concentrations in the coals, in certain samples these values exceeding by two orders of magnitude of the average of sedimentary clayey rocks. In general the distribution of the elements within the coal seams shows some accumulation in the bottom of the seam but sometimes weak accumulation can be observed on the top, as well. From the aspect of environmental protection the host phases and modes of occurrence of the elements were studied. The elements are bound not by one discrete phase (except Zn that occurs in form of discrete ZnS, i.e. sphalerite grains) but are dispersed among carbonates, organic matter, sulphides (pyrite) and ash-forming constituents. In harmony with this statement, biologically only a smaller fraction of the heavy metals is available, i.e. those occurring in water soluble and to smaller extent in weak acid soluble forms. Elements of the organic matter, sulphides and inorganic ash-forming material are biologically unavailable for the living organisms and combustion of the coal material these occur in the form of different kinds of oxides.