



Peculiarities of mercury distribution in coals

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The mercury concentration in coal varies in a wide range (from few ppb to hundreds ppm) with the world average of 100 ppb. Peculiarities of the mercury distribution in productive horizons are governed by syngenetic and superimposed geochemical processes that can lead to a great variability of the mercury concentration even within a same deposit. The initial, syngenetic mercury concentration in coal is low and its background value is close to the mercury clark in the Earth's crust and to the mercury content in peat and modern terrestrial plants. Metamorphism and subsequent hydrothermal processes can generate various mercury species in coal and bearing strata. Mercury speciation in coal can be represented by syngenetic mercury bound to organic matrix, by elemental, ionic and isomorphous mercury bound to sulfides, oxides, and silica minerals. Mercury species having different matrix binding energy can be determined by so-called thermospeciation analyses based on continuous detection of mercury release from a sample during its gradual heating (thermo-scanning). Total mercury concentration in studied brown and hard coals from Russia, Ukraine, and South Africa changes in a range of < 2 ppb to 2 ppm. Thermo-scanning technique reveals variously shaped mercury thermospectra. The low-temperature peaks can be attributed to mercury bound by physical sorption and occluded, and the mid- and high- temperature peaks to mercury bound to organic coal matrix, sulfides, and silicates. Scanning electron microscope and the electron probe microanalysis shows occurrence of mercury "micro-accumulation" zones, up to tenth of wt.%, within organic coal matrix and mineral inclusions: iron oxides, authigenic and terrigenous minerals.

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