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Peculiarities of Cobalt and Vanadium Distribution in Coal Seams of Almaz-Marievsky Geological and Industrial Area of Donbass

Studies of cobalt and vanadium distribution in coals of main working seams of Almaz-Marievsky geological and industrial region of Donbass are connected with increased requirements for environmental protection, causing the need for new scientific methods of forecasting the content of toxic and potentially toxic elements in the mined rock mass, wastes and coal dressing.

The obtained results allow drawing the following conclusions:

1. Among all the studied seams only weighted average content of cobalt in coal of seam l_1^1 and vanadium in coal of seam k_3^H exceed maximum allowable concentration.

2. Geochemical association with fluoride, lead, nickel, vanadium, chromium, and vanadium with fluoride, lead, nickel, and cobalt are typomorphic for coal of the region. The established significant positive correlation between cobalt and vanadium with content of CaO and TiO_2TiO as the constituent of coal ash as well as their participation in characteristic “vanadium” geochemical association elements-impurities allows suggesting that the dominant form of cobalt and vanadium in coals of the region is the organic one. The possibility of its existence is proved experimentally.

At the same time the revealed positive statistical link of the contents of these elements in coal of seams forming clusters 1.2 and 2 with the amount of diagenetic sulphide mineralization, ash content, content of clay minerals and micro fusainized microcomponents shows the reality of the contribution of mineral and adsorbed forms into their accumulation.

3. The accumulation of the main part of cobalt and vanadium contained in coals of the region occurred at the stages of peat accumulation and early diagenesis.

4. The association of elevated concentrations of these elements to near-roof part of the seam, the relationship of their contents with litho-facies peculiarities of rocks of the immediate roof, the degree of coal recovery as well as fluorine being available in their geochemical association (with its significant thalassofillity) indicates their preferential incoming into the basin of peat accumulation of marine waters in the process of rapid transgression. Reverse statistical link of cobalt and vanadium concentrations in coal of seams located in correspondent clusters, - 1.2, 2 and 1.1.2, 1.2, 2, - with their thickness also indicates significant tectonic mobility of the area of peat accumulation.