

REMOVAL OF URANIUM (VI) FROM THE WATER ENVIRONMENT BY MECHANOCHEMICAL ACTIVATED ORGANOCLAY

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The contamination of the environment of the uranium-mining region of Ukraine occurs as the result of the technological processes of mining and processing of uranium raw materials. Because of its radioactivity and toxicity, uranium is a very dangerous element, and the WHO recommends a limit of 0.015 mg/l for drinking water. It was established that the level of population morbidity in these districts exceeds the average indices in the region, especially in the endocrine system and oncology.

Natural sorbents, especially clay minerals have been widely used for water purification. The grinding of solids with the use of energy-intensive equipment and at the same time, the introduction of intercalates into the interlayer space of minerals prevents the destruction of the layered structure of clay during mechanochemical processing and improves the physical and chemical characteristics.

The purpose of our investigation was to obtain clay-based sorption material for application in environmental protection technologies. The montmorillonite was treated by cationic surfactant hexadecyltrimethylammonium bromide and milled at a high-energy planetary ball mill. It was established that the modification slows down the deformation and amorphization of the montmorillonite structure. In addition, the formation of two-dimensional micelles on the surface of layered silicates is accompanied by a change in surface charge from negative to positive. This makes it possible to remove not only cationic but also anionic forms of inorganic toxicants, in particular uranium (VI), from the water environment. The results indicate a significant increase in the sorption capacity and high selectivity of the synthesized materials for U(VI) ions.

Thus, the obtained sorption material with a stabilized structure and high sorption characteristics could be used in environmental protection technologies. This especially applies to surface and underground waters contaminated with uranium compounds, which are characterized by a wide variety of presence forms in the surrounding water environment.