Nanocomposites and Nanomaterials

Sorption of uranium on nanobiosorbents

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The work is focused on obtaining materials that adsorb uranium compounds. In spite of harmful environmental effects this radioactive element, has found a very important application in the power industry as a fuel in nuclear power plants. Mineral compounds, which include uranium, are a group of non-renewable resources, so alternative sources should be sought. In the natural environment, especially in water and soil, even negligible concentrations of radioactive elements often occur. The problem arises when, from such small quantities, we try to extract a desired element. Adsorption methods become extremely common due to their high efficiency and simplicity in use. There is a wide range of materials that can be used for this purpose: mineral sorbents (akagenite, hematite, diatomite, modified silica, sulfides) and natural sorbents (red and brown algae, staphylococcus aureus, modified black hair) [1,2].

Due to the prevalence and high efficiency, biosorbents are becoming increasingly popular. The sorbents made on the basis of acorns and inulin were used in the study. Properly prepared they were analyzed in a few variants where the most efficient performance was observed for three combinations of acorns and halosite, acorns and red clay and bentonite and inulin. The isotherms of adsorption, contact time and pH influence were examined. Finally, materials capable of adsorbing uranyl ions with an efficiency of 90% were obtained. The six-hour time has proven to be sufficient to establish a steady state. The highest adsorption efficiency was obtained at pH ~ 4 - 5. Based on the adsorption isotherm, it was shown that the surface of the material was heterogeneous. The sorption capacity of the obtained materials was determined being 36, 56 and 58 for the sorbents derived from acacia and halosite, acorns and red clay as well as bentonite and inulin, respectively.

1. *Aytas S., Gunduz E., Gok C*., Biosorption of Uranium Ions by Marine Macroalga Padina pavonia // Clean Soil Air Water.-2014.-**42**.-P. 498–506.
2. *Gondhalekar S.C., Shukla S.R*., Equilibrium and kinetics study of uranium(VI) from aqueous solution by Citrus limetta peels // J Radioanal Nucl Chem.-2014.-**302**.-P. 451–457.