Sorption of uranium from aqueous solution by TiO_2 composite material

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The industrial treatment of uranium followed by further processing during manufacturing of the nuclear fuel produce large amount of radioactive liquid waste. Currently, adsorption (along with ion exchange) is a common method for radioactive waste treatment. However, development and testing of new and more efficient sorbents are still in need.

Composite material with TiO_2 based nanomaterial and pyrolytic wooden waste was prepared and in addition to previous experiments with TiO_2 based nanomaterials [1], new series of tests were performed. Pyrolyzed wooden waste was used for creating carbon matrix. Properties, structure and surface morphology of prepared material were studied by XRD, SEM, EDS and BET.

The following sorption experiments were conducted in batch mode arrangement to determine the influence of various conditions on sorption behaviour. Experiments were carried out to study the influence of contact time, pH value and sorbate concentration.

Efficient removal was achieved (>95%) and the sorption of uranium was found to be pH dependent with less effectivity in strong acidic and strong alkalic environment. Sorption data were fitted with Langmuir adsorption isotherm with satisfactory agreement.

[1] Szatmáry L. *et all (2018) Sorption of radionuclides from aqueous solutions using titania based nanomaterial*

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