

Physico-chemical nanomaterials science

Adsorption of uranyl ions onto functionalized polysiloxanes with magnetic properties

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Nowadays, an increasing interest in adsorption process, as one of the most promising technique useful in many fields of science and industry can be observed. What is more, the proper choice of the adsorbent plays a crucial role in this method. Therefore, exploration of new methods allowing synthesize materials for this purpose is also observed. Nanotechnology offers broad opportunities for designing and fabrication of new types of adsorbents with enhanced properties.

In our studies, adsorbents were synthesized by using sol-gel method, based on hydrolysis and condensation of TEOS and a proper organosilane. For this purpose, three organosilanes with amine groups were used. Surface properties of those materials were studied by several techniques: XRD, nitrogen adsorption-desorption measurements and SEM microscopy. The adsorption properties of materials in relation to U(VI) ions have been studied by the batch mode technique. It was found that the adsorption process is very fast, and equilibrium is reached after about 120 minutes. The data was fitted with pseudo-1st and pseudo-2nd order equations. It was turned out that the better fit was obtained for pseudo-2nd order kinetic model. The Freundlich, Langmuir-Freundlich and Dubinin-Radushkevich isotherm equations were used to calculate the equilibrium adsorption data. The adsorption capacity determined by the Langmuir-Freundlich isotherm equation was 216.2 mg/g. The energy value calculated based on the Dubinin–Radushkevich isotherm equation ($E = 15.2$ kJ/mol) indicates that the chemisorption is the dominant mechanism [1].

1. Liu Y., Cao X., Hua R., Wang Y., Liu Y., Pang C., Wang Y. Selective adsorption of uranyl ion on ion-imprinted chitosan/PVA cross-linked hydrogel // Hydrometallurgy-2010.-**104**.P. 105-155

Authors are grateful to People Programme (Marie Curie Actions) of the FP7/2007-2013/ under REA, grant agreement no. PIRSES-GA-2013-612484 for the support of this work.