

Sorption Properties of Biological Waste for Lead Ions from Aqueous Solutions

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Abstract : Biosorption by biological waste materials from agriculture industry could be a cost-effective technique for removing metal ions from wastewater. The performance of new biosorbent systems, consisting of the waste matrixes which were magnetically modified by iron oxide nanoparticles, for the removal of lead ions from an aqueous solution was tested. The use of low-cost and eco-friendly adsorbents has been investigated as an ideal alternative to the current expensive methods. This article deals with the removal of metal ions from aqueous solutions by modified waste products - orange peels, sawdust, peanuts husks, used tea leaves and ground coffee sediment. Magnetically modified waste materials were suspended in methanol and then was added ferrofluid (magnetic iron oxide nanoparticles). This modification process gives the predictions for the formation of the smart materials with new properties. Prepared material was characterized by using scanning electron microscopy, specific surface area and pore size analyzer. Studies were focused on the sorption and desorption properties. The changes of iron content in magnetically modified materials after treatment were observed as well. Adsorption process has been modelled by adsorption isotherms. The results show that magnetically modified materials during the dynamic sorption and desorption are stable at the high adsorbed amount of lead ions. The results of this study indicate that the biological waste materials as sorbent with new properties are highly effective for the treatment of wastewater.

Keywords : biological waste, sorption, metal ions, ferrofluid

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