Effect of Carboxylic Functional Group Functionalized on Carbon Nanotubes Surface on the Removal of Lead from Water

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Abstract

The adsorption mechanism of the removal of lead from water by using carboxylic functional group (COOH) functionalized on the surface of carbon nanotubes was investigated. Four independent variables including pH, CNTs dosage, contact time, and agitation speed were carried out to determine the influence of these parameters on the adsorption capacity of the lead from water. The morphology of the synthesized multiwall carbon nanotubes (MWCNTs) was characterized by using field emission scanning electron microscopy (FESEM) and transmission electron microscopy (TEM) in order to measure the diameter and the length of the CNTs. The diameters of the carbon nanotubes were varied from 20 to 40 nm with average diameter at 24 nm and 10 micrometer in length. Results of the study showed that 100% of lead was removed by using COOH-MCNTs at pH 7, 150 rpm, and 2 hours. These high removal efficiencies were likely attributed to the strong affinity of lead to the physical and chemical properties of the CNTs. The adsorption isotherms plots were well fitted with experimental data.