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Surface modification and characterization of Jordanian kaolinite: Application for lead removal from aqueous solutions

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Abstract: Kaolinite clay was tested for removal of lead ions from aqueous solution. This clay was washed with sulfuric acid solution followed by chemical surface modification using 3-chloropropyltriethoxysilane and sodium hydroxide. XRF results showed that silica to alumina ratio was 2.8:1 for the treated sample compared to 1.6:1 for the raw one. XRD analysis displayed different distinct kaolinite and quartz peaks before treatment while kaolinite peaks were diminished after the treatment. SEM morphology indicated that the raw kaolinite appears as plate structure with no local pores on the plates. However, after treatment the surface was found to have micropores. Different adsorption isotherm models were applied to the experimental data and found that Shawabkeh? Tutunji equation best fit these data adequately. It was also found that chemisorption took place at the surface of the modified kaolinite with maximum adsorption capacity of 54.35 mg/g.