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Removal of lead (II) from aqueous solutions by adsorption onto activated carbons prepared from coconut shell

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ABSTRACT

In the nuclear field, the availability of effective techniques to eliminate lead pollution from wastewater is of interest both for the purposes of radiation protection from the radioactive isotope lead-210 and also for the issues related to the use of lead in the new generation reactors nowadays under study. Evidences exist of lead pollution due to the radioactive isotope lead-210 in the proximities of uranium extraction mines. In this study, two commercial granular activated carbons obtained by physical activation of coconut shell, specifically developed and selected to purify potable water from dissolved organics (GCN 1240) and for use in gold recovery systems (GCN 816 G), were studied in batch systems to evaluate their effectiveness for separation of lead (II) from aqueous solutions. A characterization of the two carbons, different in particle size, is provided through determination of their pH_{PZC} and scanning electron microscope analysis. Adsorption of lead (II) was observed as a function of contact time, and its kinetics were fitted. Adsorption data at equilibrium were fitted by isotherm models and the maximum adsorption capacity of the carbons resulted to be 92.39 mg/g (GCN1240) and 32.08 mg/g (GCN 816 G). Experiments were carried out to investigate effects of pH on lead adsorption, evidencing that best removal performances of lead occur near pH 5.0. The present study shows that the considered commercial granular activated carbons can be successfully adopted for removal of lead (II) by adsorption from aqueous solutions.

Keywords: Adsorption; Lead; Granular activated carbon; Batch experiments

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