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Oral Presentation

Removal of Cr(VI) İons From Aqueous Solutions by Adsorption Onto Oak (*Quercus Petraea* L.) Sawdust: Equilibrium and Kinetic Study

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Abstract

Cr(VI) is considered as a powerful carcinogenic agent that modifies DNA transcription process causing important chromosomic aberrations. Furthermore, it causes cancer in the digestive tract and lungs and may cause epigastric pain, nausea, vomiting, severe diarrhea and hemorrhage. Therefore, the removal of Cr(VI) ions from waters and wastewaters is an important issue in order to protect public health and environment. Natural and H_2SO_4 modified oak (*Quercus petraea* L.) sawdust was used as an adsorbent for removal of Cr(VI) ions from aqueous solutions. The natural and modified adsorbents were characterized with some techniques (Boehm titration, moisture content, pH_{pzc} and FTIR). Adsorption studies were performed in a batch system by transferring 10 mL of Cr(VI) solution (in the concentration range of 50–1000 mg L^{-1} at initial pH range 1.0-8.0) into a polyethylene centrifuge tube. Then 0.01-0.2 g of adsorbent was added to the solution, and the system was agitated on a mechanical shaker at 400 rpm for 0-360 min to reach equilibrium. Then the adsorbent was separated from the adsorbate by centrifugation at 3500 rpm for 5 min. The concentration of Cr(VI) ions in the solution was analysed by flame atomic absorption spectrophotometer. The effects of various experimental parameters such as solution pH, contact time, initial Cr(VI) concentration, and adsorbent concentration were evaluated upon the Cr(VI) adsorption onto natural and H_2SO_4 modified oak. The influences of foreign ions were evaluated by using different concentrations of $BaCl_2$ and NaCl solutions. Maximum Cr(VI) removal was observed at pH 2.5 and the equilibrium was attained after contact of 240 min. The experimental data were analysed by the Langmuir, Freundlich, Temkin and Dubinin Radushkevich (D-R) isotherm models. The kinetics of the adsorption was tested using pseudo-first-order, pseudo-second-order, and intraparticle diffusion models. The results showed that the adsorption of Cr(VI) ions onto both adsorbents proceeds according to the pseudo-second-order model.

Keywords: Adsorption, Removal, Heavy metal, Cr(VI), Quercus petraea L.