



Removal of heavy metal ions by adsorption onto activated carbon prepared from *Stipa tenacissima* leaves

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ABSTRACT

Biomass conversion into highly porous activated carbon (AC) materials is interesting particularly from the point of view of the reuse agricultural products. In this study, *Stipa tenacissima* leaves (STL) were used as precursor to prepare ACs by chemical activation method using phosphoric acid at different activation temperatures and a holding time of 1 h. The ratio of chemical activating agent to precursor was approximately 3:1. The effect of activation temperature on the textural properties of AC was studied. The optimum surface area obtained was 1,125 and 1,260 m² g⁻¹ calculated using the Brunauer–Emmett–Teller equation and Langmuir equation, respectively. This AC, SAC 500, was tested in the adsorption of heavy metal ions from aqueous solutions, and the experimental conditions studied were contact time, pH and initial concentration, reaching the optimum experimental conditions. The adsorption experiments revealed relatively high adsorption kinetics, being the equilibrium time 90 min approximately, which follows the pseudo-second-order kinetic model. The Langmuir model provided the best fit to the experimental data. The thermodynamic parameters indicate that the adsorption process is spontaneous and endothermic. Bearing in mind these outstanding properties and the AC preparation methodology optimized, it is expected that an economical procedure for the treatment of wastewater can be obtained for the removal of heavy metal ions.

Keywords: Activated carbon; *Stipa tenacissima* leaves; Chemical activation; Heavy metals; Adsorption

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