

Sorptive Removal of Lead (II) from Aqueous Solution using Value Added Tea-Waste Biochar Produced Under Different Temperatures.

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The removal of lead from aquatic systems using biochar (BC) derived from tea-waste was evaluated. The customized in-house method of BC production was incorporated slow pyrolysis at 300 °C (300BC), 500 °C (500BC) and 700 °C (700BC). The different BC types were subjected to a nitric acid modification and magnetization. Results showed reduced adsorption capacities for nitric modified BC. Batch sorption experiments were conducted to evaluate the effect of pH, equilibrium time, associated kinetic models and the thermodynamic basis of lead uptake. For both Non-Modified Biochar (NBC) and Magnetized Biochar (MBC), an acceptable fit for the pseudo second order kinetic model with regression coefficients greater than 0.998 justified a chemisorption process. The dominant mechanism for 700BC can be considered as pore filling together with π electron sharing between the graphene rings and lead whereas sorption on 300BC was governed by electrostatic interactions. Adsorption isotherms modeled were Langmuir, Freundlich, Sips, Redlich- Peterson and Toth, out of which the results were seen to best fit Langmuir and Sips models. A maximum Langmuir capacity of 57.80 mg/g and 48.61 mg/ for 700NBC and 700MBC were obtained respectively. Positive enthalpies and free energies indicated a non-spontaneous and exothermic sorption. Magnetic modification decreased sorption capacities by 15.86 % but led to the easy removal of biochar after the sorption.

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