



## Adsorption of boron from aqueous solutions by activated carbon impregnated with salicylic acid: equilibrium, kinetic and thermodynamic studies

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### ABSTRACT

The adsorption of boron from aqueous solution containing boron by activated carbon impregnated with salicylic acid (ACISA) was studied in a batch system. In order to investigate the effect of initial boron concentration and temperature on boron adsorption capacity of ACISA; the equilibrium, kinetic and thermodynamic parameters were calculated. The adsorption capacity data were obtained by using Langmuir and Freundlich isotherm models and both models fitted well. The pseudo-first-order, pseudo-second-order and the intraparticle diffusion models were used to describe the kinetic parameters and the rate constants were evaluated. The experimental data fitted very well the pseudo-second-order kinetic model. The activation energy ( $E_a$ ) calculated using the Arrhenius equation was found to be 58.25 kJ mol<sup>-1</sup>. Various thermodynamic parameters such as Gibbs free energy ( $\Delta G^\circ$ ), enthalpy ( $\Delta H^\circ$ ) and entropy ( $\Delta S^\circ$ ) changes were computed and the results showed that the adsorption of boron onto ACISA was spontaneous and endothermic in nature.

*Keywords:* Boron removal; Adsorption; Activated carbon; Salicylic acid; Kinetics; Thermodynamics

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