



Adsorptive removal of phosphate from aqueous solution by chemically modified biosorbent

Salah Benyoucef, Moussa Amrani*

Laboratory of Soft Technology, Recovering, and Sustainable Development Faculty of Science,
M'Hamed Bougara University, Boumerdes, Algeria
Tel. +213 9775871699; email: moussaamrani@yahoo.fr

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ABSTRACT

In the present study, chemically modified biosorbent (*Pinus halepensis* Miller) was used for removal of phosphate from water. Biosorbent preparation process included size fractionation, extraction for surface activation, acid prehydrolysis, and treatment with urea. Sorption of phosphate ions onto biosorbent was studied using the batch technique. The effect of different parameters such as contact time, adsorbate concentration, and temperature was investigated. The adsorption kinetics data were best described by the pseudo-second-order rate equation, and equilibrium was achieved after 40 min. The Langmuir and Freundlich equations for describing adsorption equilibrium were applied to data. The constants and correlation coefficients of these isotherm models were calculated and compared. The adsorption isotherms obey the Freundlich equation. The thermodynamic parameters like free energy, enthalpy and entropy changes for the adsorption of phosphate ions have been evaluated and it has been found that the reaction was spontaneous and endothermic in nature. The low value of activated energy of adsorption, 3.088 kJ mol⁻¹ indicates that the phosphate ions are easily adsorbed on the sawdust. Results suggest that the prepared chemically modified Aleppo pine sawdust has potential in remediation of contaminated waters by phosphate.

Keywords: Sawdust; Biosorbent; Low cost; Phosphate removal; Adsorption isotherms; Kinetics; Thermodynamics

*Corresponding author.