



A novel Turkish natural zeolite (clinoptilolite) treated with hydrogen peroxide for Ni²⁺ ions removal from aqueous solutions

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ABSTRACT

The removal of Ni(II) from aqueous solution by batch adsorption technique using a novel Turkish zeolite from Akdere region was investigated. Activation of the zeolite was achieved with hydrogen peroxide. After elementary characterization of the adsorbent, the influence of contact time, pH, adsorbent amount, initial Ni(II) concentration, and temperature on the selectivity of the removal process was investigated. Results showed that increase in adsorbent dosage led to increase in Ni(II) adsorption due to increased number of adsorption sites. Freundlich model fitted the experimental data better than Langmuir model. Adsorption process was found to be highly pH dependent. The optimum pH for adsorption of Ni(II) was found to be 7. Adsorption equilibrium attained within 1 h time. The sorption of Ni(II) increased with rise of temperature. The adsorption process was spontaneous ($\Delta G^\circ_{\text{ads}} < 0$) and endothermic ($\Delta H^\circ_{\text{ads}} > 0$), supporting also the chemisorption is the rate-determining step.

Keywords: Ni(II) removal; Zeolite; Isotherms; Kinetics; Thermodynamic values

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