Sorptive potential of glutaraldehyde cross-linked epoxyaminated chitosan for the removal of Pb(II) from aqueous media: kinetics and thermodynamic profile

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ABSTRACT

In this study, the removal of Pb(II) ion from aqueous solutions by glutaraldehyde-cross-linked epoxyaminated chitosan (GA-C-ENCS) was investigated. The adsorbent (GA-C-ENCS) was characterized by FTIR, SEM–EDS, X-ray photoelectron spectroscopy, and potentiometric titration. Equilibrium sorption experiments were carried out at different operational conditions such as concentration, temperature, and pH values. Among the equilibrium studies the Langmuir isotherm model yields a much better fit than the Freundlich and Dubinin–Radushkevich models. The kinetics of sorption was investigated. The response time evaluation and batch adsorber design analysis was carried out using operational lines. Thermodynamic parameters reveal the spontaneous nature of sorption.

Keywords: Adsorption kinetics; Pb(II) removal; Chitosan; Thermodynamics; Counter current operation