Production of physically and chemically modified biomass of corncob and its applications for the removal of Co(II) ion from its aqueous solution: optimum conditions determination

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ABSTRACT

In the present study, the use of agricultural waste product such as corncob (in its native, physically and chemically modified form) has been examined as a potential replacement for the expensive adsorbents for the removal of Co (II) from aqueous solutions. The influence of the parameters such as solution pH, initial metal concentration and time of contact on abatement of Co (II) metal were assessed. The uptake capacity \( q \) (mg g\(^{-1}\)) of biomass clearly increased with increase in pH up to optimum pH 4 followed by precipitation at higher pH values. Initially, the biosorption rate was very fast followed by slow sorption showing equilibrium was reached at around 60 to 120 min. Equilibrium data were found to explain well by Freundlich isotherm than by Langmuir isotherm with \( R^2 = 0.999 \) and kinetics was well explained by pseudo-second-order with correlation coefficient values close to unity. Therefore, corncob being abundant and low cost can serve as natural biosorbent for exclusion of Co (II) metal from aqueous solution.

Keywords: Corncob; Heavy metals; Pretreatments; Kinetics; Equilibrium modeling