

Adsorption of Cu(II) and Zn(II) ions from aqueous solutions onto fine powder of *Typha latifolia* L. root: kinetics and isotherm studies

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Abstract Fine powder of *Typha latifolia* L. root was used for adsorption of copper and zinc ions from buffered and nonbuffered aqueous solutions. The adsorption reached equilibrium in 60 min. During this time, more than 90 % of the adsorption process was completed. The effect of initial pH, initial concentration of metal ion, and contact time was investigated in a batch system at room temperature. The optimum adsorption performance was observed at pH 5.00 and 4.25 for nonbuffered solutions of Cu(II) and Zn(II), respectively, while for buffered solutions it occurred at pH 6.00. The total metal uptake decreased on application of ammonium acetate buffer, from 37.35 to 17.00 mg g⁻¹ and 28.80 to 9.90 mg g⁻¹ for Cu(II) and Zn(II) solutions, respectively, with 100 mg L⁻¹ initial concentration. The pseudo-first-order, pseudo-second-order, intraparticle diffusion, and Elovich models were used to describe the adsorption kinetics. The experimental data followed the pseudo-second-order kinetic model. The biosorption equilibrium was well described by Langmuir and Freundlich isotherm models.

Keywords Adsorption · *Typha latifolia* L. · Heavy metal · Kinetic model · Isotherm model

Introduction

Sorption, the transfer of ions from a soluble phase to a solid phase, is an important mechanism for removal of metals in wetlands [1]. Nowadays we know that freshwater resources worldwide are being contaminated by various toxic elements

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