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Removal of copper (II) from wastewater by heartwood powder of *Areca catechu*: kinetic and equilibrium studies

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ABSTRACT

The adsorptive behavior of heartwood powder of *Areca catechu* for copper(II) ion from synthetic wastewater has been investigated as a function of contact time, initial concentration of copper(II) ion, solution pH and biosorbent dosage, using batch method at room temperature. The optimum conditions for the metal adsorption were found to be at 0.5 g biosorbent dose, pH 5.5, and 30 min equilibrium time for the entire concentration range of the adsorbate. The equilibrium adsorption data were fitted to Langmuir, Freundlich and Dubinin-Radushkevich adsorption isotherm models and the model parameters were evaluated. The maximum adsorption capacity obtained from Langmuir isotherm model was found to be 9.578 mg g^{-1}. The kinetic study showed that the pseudo-second-order kinetic model better described the biosorption process in comparison to pseudo-first-order, Elovich and intra-particle diffusion kinetic model. FT-IR spectrum analysis revealed that O-H, N-H and C-O groups present in the adsorbent were the primary copper(II) ion binding groups.

Keywords: Adsorption; *Areca catechu*; Copper(II); Equilibrium; Heartwood powder; Kinetics

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