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Reclamation of wastewater containing Cu(II) using alginated *Mentha spicata* biomass

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ABSTRACT

The task of looking for new and potentially feasible metal biosorbents has a wide scope. In the present work, optimization of thermodynamic and kinetic parameters has been carried out for the removal of Cu(II) from aqueous solution using *Mentha spicata* distillation waste (native and alginated) biomass. *M. spicata* distillation waste biomass was efficiently used for toxic Cu(II) removal under optimized conditions of pH, biosorbent dose, biosorbent size, initial metal concentration, contact time, and desorption. Langmuir adsorption isotherm and pseudo-second-order kinetic models fitted well to Cu(II) sorption by native and alginated *M. spicata* distillation waste biomass. The significant changes in the vibrational frequencies of Fourier transform infrared spectra implicated that carboxylic, carbonyl, and nitrile groups played vital role during Cu(II) biosorption process. A new peak at 1,735 cm^{-1} corresponding to the –C=O groups appeared, suggesting that –C–O groups oxidized to –C=O groups during biosorption process. Alginated *M. spicata* distillation waste biomass exhibited a very high Cu(II) adsorption capacity (176.96 mg/g).

Keywords: Cu(II); *Mentha spicata*; Biosorption; FTIR; Immobilization

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