



Dynamic biosorption characteristics and mechanisms of dried activated sludge and *Spirulina platensis* for the removal of Cu^{2+} ions from aqueous solutions

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ABSTRACT

During biosorption, removal is ensured by several mechanisms that occurred between living or nonliving microorganisms and transporting metal ions. In this study, the kinetics, equilibrium, and thermodynamics of the biosorption of Cu^{2+} onto dried activated sludge and *Spirulina platensis* from aqueous solution were investigated at different experimental conditions. The biosorption characteristics were investigated with respect to some of the significant parameters including the effect of pH, biosorbent dosage, and temperature. The Langmuir, Freundlich, and Temkin equilibrium adsorption models were studied. Results showed that Langmuir isotherm model fitted well the experimental data followed by the other isotherm models used. In order to determine the mechanism of the biosorption, kinetic models were applied. The results of the kinetic studies indicated that the biosorption processes fitted the pseudo-second-order model. The thermodynamic parameters were also calculated, and the values indicated that the biosorption process was spontaneous, exothermic, and more ordered in nature.

Keywords: Biosorption; Copper removal; Dried activated sludge; *Spirulina platensis*; Thermodynamics

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