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COPPER(II) BIOSORPTION CHARACTERISTICS OF LYOPHILIZED AND THERMALLY TREATED PSEUDOMONAS CELLS

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Abstract

Biosorption of copper(II) by lyophilized and thermally treated bacterial biomass of *Pseudomonas aeruginosa* PAO1 and *Pseudomonas fluorescens* BME in aqueous suspension was studied. The cell surface properties were characterized and the experimental conditions, *e.g.*, pH, adsorption time, and initial metal concentration were optimized for efficient biosorption. The surface charge was negative at pH above 2.5 for *P. aeruginosa*, and above pH 4 for *P. fluorescens*. The highest copper(II) uptake was observed at pHs 5 to 6 for both bacteria with a maximum uptake capacity of 60.3 and 56.5 mg copper(II)/g biomass for *P. aeruginosa* and 56 and 29 mg/g for *P. fluorescens* by the lyophilized and thermally treated cells, respectively. Both, the Freundlich and the Langmuir model, using non-linear least-squares estimation, gave a good prediction to the experimental data of copper(II) biosorption equilibrium. For the biosorption kinetic study only the pseudo second-order kinetic model could be applied at various temperatures. Temperature has only a minor effect on the adsorbed amounts in the experimental conditions studied. The laboratory bacterial strain *P. aeruginosa* PAO1 is more efficient adsorbent for copper(II) than *P. fluorescens* BME in lyophilized and even in thermally inactivated form.

Key words: biosorption, copper, isotherm, kinetics, Pseudomonas sp., temperature

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