Environmental Engineering and Management Journal *February 2019, Vol.18, No. 2, 455-464*
http://www.eemj.icpm.tuiasi.ro/; http://www.eemj.eu

"Gheorghe Asachi" Technical University of Iasi, Romania

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

Anikó Kőnig-Péter[1], Ferenc Kilár[1,2], Tímea Pernyeszi[2,3]*

[1]Institute of Bioanalysis, Faculty of Medicine, University of Pécs, Szigeti út., 12, 7624 Pécs, Hungary
[2]Department of Analytical and Environmental Chemistry, Faculty of Science, University of Pécs, Ifjúság útja 6., 7624 Pécs, Hungary
[3] Environmental Analytical and Geoanalytical Research Group, Szentágothai Research Center, University of Pécs, Ifjúság útja 34., 7624 Pécs, Hungary

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.

Keywords: biosorption, copper, isotherm, kinetics, *Pseudomonas* sp., temperature

Received: July, 2013; Revised final: October, 2015; Accepted: November, 2015; Published in final edited form: February, 2019

*Author to whom all correspondence should be addressed: e-mail: ptimea@gamma.ttk.pte.hu; Phone: +3672536000/24851; Fax: +36501518