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Evaluation of a deep-sea mesophilic bacteria exopolysaccharides in removal of low concentration Pb(II) from aqueous medium

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ABSTRACT

Wangia profunda SM-A87, representative of a new genus of family *Flavobacteriaceae*, was isolated from deep-sea sediment samples near the southern Okinawa. The exopolysaccharides (EPS) produced by *W. profunda SM-A87* was used as an absorbent of Pb(II) from low concentration solution in this paper. The effect of various parameters such as EPS concentration, pH, temperature, contact time, ionic strength and the competitive adsorption of Pb(II), Cu(II), Cd(II) were evaluated in batch technique. The adsorption kinetic and isotherm were also calculated. The preferences biosorption conditions were, EPS dosage at 0.1~0.2 mg/l, pH value at 5.5, temperature at 20~30°C and contact time for 60 min, respectively. Coexistent cations decreased Pb(II) uptake in the order of K^+<Na^+<Ca^{2+}<Mg^{2+}. The maximum adsorption capacity of Pb(II) was 357 mg/g at 30°C which was much higher than those of other biosorbents. The adsorption data fitted better to the Langmuir equation than Freundlich equation. The pseudo second-order kinetic model provided the better correlation for the adsorption process, compared with the pseudo first-order kinetic model. The competitive biosorption results indicated that Cu(II) had a greater effect on Pb(II) biosorption compared with Cd(II). Functional groups (—OH, —COO and C—O—C) of SM-A87 EPS possibly involved in Pb(II) biosorption process signed by the FT-IR spectrum. This paper indicates that SM-A87 EPS could be applied in wastewater treatment as a promising Pb(II) absorbent.

Keywords: Wangia profunda SM-A87; Exopolysaccharides; Biosorption; Pb(II)

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