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Lead(II) biosorption of an Antarctic sea-ice bacterial exopolysaccharide

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ABSTRACT

Biosorption behavior and mechanism of an exopolysaccharide (EPS) secreted by a psychrotolerant bacterium *Pseudoalteromonas* sp. Bsi20310 isolated from Antarctic sea-ice, for lead(II) from synthetic wastewater were studied in this paper. Effects of salinity, pH and dosage of Bsi20310 EPS on biosorption characteristics for lead(II) were evaluated by batch biosorption tests. The results indicated that Bsi20310 EPS presented better biosorption performance for lead(II) in salt water than in salt-free water. The equilibrium biosorption isotherms fitted well to both Langmuir and Freundlich isotherm models. Theoretical maximum biosorption capacity of 191.90 mg g^{-1} calculated according to Langmuir equation indicated that Bsi20310 EPS had a high biosorption capacity for lead(II). The kinetics of lead(II) biosorption onto Bsi20310 EPS could be better described by pseudo-second-order model than pseudo-first-order both in salt-free water and in salt water. External surface biosorption was the major biosorption mechanism while intraparticle diffusion was not the unitary rate-limiting step for the whole biosorption. Fourier transform infrared spectroscopy (FT-IR) analysis indicated that the functional groups such as –OH, C=O and C–O–C on Bsi20310 EPS may play important roles as biosorption sites in lead(II) biosorption.

Keywords: Lead(II) biosorption; Isotherms; Kinetics; Antarctic sea-ice bacterium; Salt water; Exopolysaccharide

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