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LEAD (II) BIOSORPTION BY A METAL TOLERANT STREPTOMYCES STRAIN

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Abstract

The aim of the present study is the optimization of biosorption conditions using a metal tolerant actinomycete (strain 723) for the removal of lead ions from waste water in batch and dynamic flow mode. The optimum conditions for lead biosorption by the strain were determined as initial pH 3.0, biomass amount 2.0 g L^{-1}, and initial metal concentration 400 mg L^{-1} in the batch condition. The maximum lead biosorption performance was obtained with a 19 mm diameter column, a 1 mL min^{-1} flow rate, and 400 mg L^{-1} initial metal concentration in the packed-bed column. The dried and wet mycelia biomasses of the strain were also compared in batch and packed-bed column systems to determine the best biosorbent types. In addition, dried cells immobilized with agar and Ca-alginate were also used in the packed-bed column studies. The Freundlich isotherm model fitted experimental data the best. In experiments for reusing capacity, Ca-alginate immobilized biosorbent had a significant residual adsorption capacity in Pb^{+2} sorption (q: 116.00 mg g^{-1}) even after five biosorption-desorption cycles. A biosorption yield of 91% was obtained at 400 mg L^{-1} initial Pb^{+2} concentration in large scale studies in reactor systems. The assignment of the studied biosorbent, actinomycete strain 723, to *Streptomyces* genus was supported by using cell wall and 16S rRNA analysis.

Key words: batch, biosorption, dynamic flow mode, lead, *Streptomyces*

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