S. Çetintaş, D. Bingöl*

OPTIMIZATION OF Pb(II) BIOSORPTION WITH DATE PALM (*PHOENIX DACTYLIFERA L.*) SEEDS USING RESPONSE SURFACE METHODOLOGY

Department of Chemistry, Kocaeli University, Turkey
*denizbingol1@gmail.com

Date palm seeds (Phoenix dactylifera L.) were investigated as a biosorbent for removal of Pb(II) ions, which has a toxic effect on the environment. A batch sorption process was applied. Optimization of Pb(II) biosorption ontodate palm seedswas successfully carried outusing response surface methodology. The effects of process variables, such as pH, initial Pb(II) concentration and biosorbent mass, on the adsorbed amount of Pb(II) were investigated using Box-Behnken design. The fitted results were found to be in good agreement with the results obtained by performing the experiments. The second-order response function showed that pH and initial Pb(II) concentration had positive effects, while biosorbent mass showed a negative effect. Initial Pb(II) concentration was the most significant factors that affected the removal of Pb(II) under the studied conditions. The maximum uptake of Pb(II) predicted by optimization plots was 24.07 mg/g at pH 5 initial Pb(II) concentration 100 mg/L and biosorbent mass 0.100 g.

Keywords: biosorption, Box-Behnken design, date palm (*Phoenix dactylifera L.*) seeds, Pb(II).

Introduction

Lead is a heavy metal that is toxic at very low exposure levels, and has acute and chronic effects on human health. Humans can be exposed to lead through air, food, contaminated soil, drinking water, deteriorating paint, and dust. It is a multi-organ system toxicant that can cause neurological, cardiovascular, renal, gastrointestinal, hematological and reproductive effects. The type and severity of effects depend on the level, duration and timing of exposure [1]. A new technology alternative has been pioneered to remove toxic heavy metals from industrial effluents by using low cost adsorbents in natural and modified forms. It is called biosorption based on binding capacities of various biological materials, which are the naturally abundant. It is effective, simple and cheap.

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