Mineralia Slovaca, 42 (2010), 376
ISSN 0369-2086

Removal of lead(II) and cadmium(II) ions by immobilized waste yeast from the wastewater

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Key words: biosorption, lead and cadmium ions, biomass

Abstract

Heavy metal pollution has become one of the most serious environmental problems today. The intensification of industrial activity during recent years is greatly contributing to the increase of heavy metals in the environmental, mainly in the aquatic systems. Cadmium and lead are heavy metals, which pose serious health hazards through the entry into the food chain by anthropogenic pathways.

Biosorption, using biomaterials such as bacteria, fungi, yeast and algae, is regarded as a cost-effective biotechnology for the treatment of the high volume and low concentration complex wastewaters containing heavy metal(s) in order of 1 to 100 mg/L. Using immobilized biosorbent as a column material the biosorption of the heavy metals could be studied in the flow system under the dynamical conditions. The immobilization of the biosorbent by the biotic or synthetic polymer raised the mechanical substance stability, as well as the size-distribution, porosity, proof against the environmental effect of the biosorbent. Immobilized fungal cells may be re-used, immobilization reduces the cell wastes, minimizes the loss of product and facilitates the product recovery, in particular when in situ product removal is performed.

In the present study our aim was to optimize the composition of *Saccharomyces cerevisiae* biomass immobilized in the calcium alginate matrix. The biosorbent is brewery waste fungal cells. Decreasing the calcium alginate concentration, the adsorption capacity increase of *Saccharomyces cerevisiae* was obtained. The maximum biosorption capacity of the fungal biomass in the wastewaters, based on the dry weight, was determined under pH controlled conditions by varying the following experimental parameters: heavy metal concentration, biomass dosage, pH, adsorption time and temperature.

Equilibrium and kinetic investigation of cadmium (II) and lead (II) sorption in aqueous suspension were determined varying the calcium alginate and biomass concentrations in biosorbents using the batch technique.

Acknowledgements. Timea Pernyeszi, Katalin Tálos, Silvia Jakabova and Alzbeta Hegedűsova gratefully acknowledge the support for this research from the Hungarian-Slovak Intergovernmentals & Cooperation Programme (APVV FK-HU 0018-08, SK 18/2008) between the University of Pécs and the Constantine the Philosopher University for 2009-2011.

Rukopis doručený 22. 6. 2010
Rukopis akceptovaný red. radou 7. 9. 2010
Revidovaná verzia doručená 19. 10. 2010