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BINARY BIOSORPTION OF Cu(II)-Pb(II) MIXTURES ONTO PINE NUTS SHELL IN BATCH AND PACKED BED SYSTEMS

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Abstract

The study of binary biosorption of Pb (II) and Cu (II) was performed by pine nuts shell. Results were compared with the single biosorption of Pb (II) and the single biosorption of the Cu (II). Experiments were performed in batch stirred and in a continuous system. The presence of lead caused a slightly decrease of the copper biosorption yield and can be related to the copper equilibrium uptake. This antagonistic action can be related to competition phenomena between metal ions in solution for active sites presented on the pine nut shell. The affinity of Pb (II) for pine nuts shell was higher than that of Cu (II). The extended Langmuir model and the extended Sips model were used to fit experimental data from binary experiments carried out in batch stirred system. Both models correctly fitted biosorption equilibrium data in range of concentrations studied. Differences obtained by both models were small; however, extended Sips model reproduced lightly better experimental results tan the extended Langmuir one. In the binary system, the maximum biosorption capacities obtained were 2.22 and 7.14 mg/g for Cu (II) and Pb (II) respectively. Finally, breakthrough curves in single systems for Cu (II) and Pb (II) were reported and they were compared with breakthrough curves for binary metal solutions. The competition between ions in the column were evaluated according to some obtained parameters, as biosorption capacity, amount of metal loading on pine nuts shell surface, total biosorption yield, breakthrough and exhausted times, etc.

Key words: binary metal mixture, biosorption, copper, lead, pine nuts shell

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