

Simulation of chromium(III) ions biosorption from aqueous environment by olive stone biomass in a fixed-bed column and analysis of effective parameters using computational fluid dynamics method

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ABSTRACT

In this study, Langmuir and dose-response models for chromium(III) ion biosorption from aqueous environment in a fixed-bed system are presented. Conservation and momentum equations for adsorption of metals ions are solved using computational fluid dynamics method with COMSOL multiphysics software. Simulation results for dose-response model show good agreement with experimental data. Also, a parametric study was conducted to investigate the effects of porosity, bed height, the input flow rate and the concentration of chromium(III) ion. Moreover, individual systems, two-component and three-component chromium, copper, lead and cadmium ions are studied. The results show that cadmium ion has the lowest, and copper ion has the highest penetration curve breakdown.

Keywords: Heavy metal ion; Chromium(III); Biosorption; Fixed-bed; Computational fluid dynamics; Aqueous solution

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