Biosorption of Pb(II) from aqueous solution by spent black tea leaves and separation by flotation

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ABSTRACT
The aim of this study was to investigate the ability of spent black tea leaves (SBTL) to remove lead from aqueous solution using biosorptive-flotation process. The biosorption process revealed that the SBTL was an effective biosorbent of lead and the maximum biosorption capacity was 19.7 mg/g after 180 min of contact time and at pH 5. Isotherm studies conducted at different initial metal concentration revealed the applicability of Freundlich isotherm model. Kinetic study explained the pseudo-first-order model as the best fit, suggesting that the biosorption process is presumably a physical sorption. Fourier transform infrared spectrometry indicated that the carboxyl, amino, and sulfonic groups on the biosorbent surface were the major groups responsible for the binding of lead ions. The flotation process, in which sodium dodecyl sulfate was used as a surfactant, increased the biosorption removal efficiency from 91 to 99%.

Keywords: Biosorption; Flotation; Lead; Tea leaves; Isotherm; Kinetics

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