A pretreated green biosorbent based on Neem leaves biomass for the removal of lead from wastewater

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\textbf{ABSTRACT}

In the present study, \textit{Azadirachta indica} (Neem) leaves biomass (a green biosorbent) was pretreated chemically and physically for possible application in the removal of lead from wastewater. Neem leaves biomass was pretreated chemically with the following chemicals HgCl$_2$, CH$_3$COOH, CH$_3$CHO, and Oxalic acid and heating, autoclaving, ultrasonic bath, and boiling were used for physical pretreatment. Among all the pretreatments, boiling, acetic acid, and autoclaving pretreatments were proven to be effective at pH 5. Percentage removal of lead was 93.48\% (boiling) > 91.85\% (acetic acid) > 86.68\% (autoclave) > 82.48\% (control) and the maximum adsorption capacity (q) was 91.34 mg g\textsuperscript{-1} (boiling) > 89.75 mg g\textsuperscript{-1} (acetic acid) > 84.70 mg g\textsuperscript{-1} (autoclave) > 80.6 mg g\textsuperscript{-1} (control) after 24 h. Langmuir and Freundlich isotherms were used to represent the equilibrium relationship for different initial lead concentrations in order to understand the adsorption process. The Langmuir isotherm model was found to be useful to explain sorption mechanism. Sorption system followed second-order kinetic model, which indicates that the rate-controlling step is chemisorption.

\textit{Keywords}: \textit{Azadirachta indica}; Biosorption; Langmuir; Freundlich; Lead; Pretreatments

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