Performance evaluation of natural iron-rich sandy soil as a low-cost adsorbent for removal of lead from water

Yee Sern Ng\textsuperscript{a}, Bhaskar Sen Gupta\textsuperscript{b,1}, Mohd Ali Hashim\textsuperscript{a,*}

\textsuperscript{a}Faculty of Engineering, Department of Chemical Engineering, University of Malaya, 50603 Kuala Lumpur, Malaysia, Tel. +60 12 6453952; email: yeessern86@yahoo.com (Y.S. Ng), Tel. +60 3 79675296; Fax: +60 3 79675319; email: alihashim@um.edu.my (M.A. Hashim)

\textsuperscript{b}School of the Built Environment, Heriot-Watt University, Edinburgh Campus, EH14 4AS Edinburgh, Scotland, UK, Tel. +44(0)131 451 8171; email: b.sengupta.hw.ac.uk (B.S. Gupta)

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\textbf{ABSTRACT}

Technical feasibility of natural iron-rich sandy soil as a low-cost adsorbent for removal of lead from water was investigated. The soil, which had an iron content of 3,719 mg/kg, was collected from Hulu Langat, Malaysia, and was used for adsorption studies without any surface modification through chemical treatment. The effects of pH, solution:soil ratio and initial lead concentration on the adsorption efficiency were studied using response surface methodology based on Box–Behnken experimental design. The results showed that pH of the solution had the highest impact on the adsorption efficiency whereby adsorption efficiency of 97% could be achieved at pH 3.5–5. The experimental data were also checked for compliance with different kinetic models and adsorption isotherms. The adsorption process was found to be rapid monolayer chemisorption with adsorption capacity of 0.9–1.0 mg/g, as it fitted Langmuir isotherm and followed pseudo-second-order kinetic model.

\textit{Keywords: Natural iron-rich sandy soil; Lead; Adsorption; Adsorption kinetics; Adsorption isotherm}

\textsuperscript{*}Corresponding author.

\textsuperscript{1}Former affiliation: School of Planning, Architecture and Civil Engineering, Queen’s University Belfast, David Keir Building, Belfast BT9 5AG, UK

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