Engineering behavior influence of basaltic rocks on the adsorption of heavy metal ions

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\textbf{ABSTRACT}

Basaltic rocks obtained from Qusier area, south Eastern Desert, Egypt showed to be effective in removing heavy metals from aqueous solution. According to mechanical and engineering scheme, the basaltic rocks were classified into basalt weathering grade I (BWGI) and basalt weathering grade II (BWGII). The adsorption of Pb\textsuperscript{2+} using BWGI and BWGII from aqueous solution was studied under various conditions. The uptake of Pb\textsuperscript{2+} was rapid with maximum adsorption within 90 min for BWGI and 60 min for BWGII. The kinetic of the Pb\textsuperscript{2+} adsorption was studied using pseudo-first-order, pseudo-second-order, Elovich and intraparticle diffusion models. The kinetics data showed that the adsorption of Pb\textsuperscript{2+} onto basalt proceeds according to the pseudo-second-order model. The results obtained from adsorption isotherm indicated that the maximum adsorption capacities of Pb\textsuperscript{2+} were 15.92 and 23.31 mg/g by BWGI and BWGII, respectively. The mean sorption energy (E) obtained from Dubinin-Radushkevich isotherm model indicated that, the adsorption process takes place chemically and the reaction is endothermic. The results suggested that natural basalt, especially, BWGII is suitable as an adsorbent material for adsorption of Pb\textsuperscript{2+} from aqueous solutions.

\textit{Keywords:} Engineering behavior of basalts; Mechanical classification of basalts; Grade of weathering; Adsorption; Kinetic and isotherm models

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