OPTIMIZATION OF LEAD (II) ADSORPTION OF EDTA-FUNCTIONALIZED MAGNETIC GRAPHENE OXIDE USING RESPONSE SURFACE METHODOLOGY

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ABSTRACT

Chronic intake of lead contaminated water, even at low concentrations, can cause damage to the digestive, reproductive and nervous systems. To effectively remove lead in water, solid phase extraction or adsorption is being used. In this study, EDTA-functionalized magnetic graphene oxide (EmGO) adsorbent was fabricated using a stepwise modification of graphene oxide (GO). It was characterized using SEM, FTIR and XRD. EmGO was shown to have improved adsorption capacity towards Pb(II) in natural water. Also, the magnetic property of the adsorbent allowed an easier and more convenient mean of retrieval. The generated response surface model from Box-Behnken design (BBD) approximated the optimum condition for maximum removal efficiency of EmGO. Based on the results, the model had a 0.9113 (±0.0001) overall desirability, optimum values for pH, adsorbent dosage and contact time were 5.99 (±0.01), 12.2135 (±0.0001) and 48.39 (±0.01), respectively. The highest percent removal efficiency of EmGO in the experiment was determined to be 73.41 (±0.01) %.

Keywords:

Graphene oxide (GO), Fe_3O_4, EDTA, adsorption, water treatment, heavy metals, lead, RSM