

عنوان مقاله:

Removal of lead and cadmium with an optimized composite of expanded graphite/g-C₃N₄/phenylenediamine

محل انتشار:

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خلاصه مقاله:

In this study, an optimized composite of expanded graphite /g-C₃N₄ /phenylenediamine was synthesized and characterized by SEM, FESEM, EDS, XRD, and BET methods. The composite was prepared with an optimized combination using response surface methodology (RSM) as a proper adsorbent for eliminating heavy metals from water samples. The evaluation of the final adsorbent was accomplished by removing metal ions like Pb²⁺ and Cd²⁺. Under the optimum adsorption conditions for Pb²⁺ and Cd²⁺ (pH: 5, adsorbent dosage: 2 g/L, and Time: 60 min), elimination efficiencies were 78.4% for Cd²⁺ and 71.35% for Pb²⁺. pH was the most important factor that influenced the adsorption rate. A short contact time for maximum removal efficiency was reported because of the porous structure of the constructed composite. As a result of the absorptive construction, the equilibrium showed a satisfactory agreement with the Freundlich model. The kinetic evaluations showed that the adsorption process of both heavy metals fitted the pseudo-second-order model. Furthermore, the results of thermodynamic studies indicated that the adsorption was an endothermic and spontaneous process. A series of regeneration experiments (5 cycles) was directed to evaluate the adsorbent reusability. The results presented that it was a suitable adsorbent for heavy metal uptake from aquatic solutions.

کلمات کلیدی:

Response Surface Methodology, Expanded graphite, Adsorption, Cadmium, Lead

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