

عنوان مقاله:

Simultaneous removal of Cd(II), Ni(II), Pb(II) and Cu(II) ions via their complexation with HBANSA based on a combined ultrasound-assisted and cloud point adsorption method using CSG-BiPO₄/FePO₄ as novel adsorbent: FAAS detection and optimization process

محل انتشار:

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خلاصه مقاله:

Ultrasound irradiation, cloud point and adsorption methods were coupled to develop a new technique for the simultaneous removal of Cd(II), Ni(II), Pb(II) and Cu(II) ions after their complexation with (E)-4-((2-hydroxybenzylidene) amino) naphthalene-1-sulfonic acid (HBANSA). In order to reduce cost and improve practicability of process, chitosan gel (CSG) composited with bismuth(III) phosphate/iron(III) phosphate nanoparticles (CSG-BiPO₄/FePO₄) were hydrothermally synthesized followed by their characterization using FESEM, EDS and XRD analysis. The operational parameters such as metal ions concentration, CSG-BiPO₄/FePO₄ mass, sonication time and temperature were investigated and optimized using central composite design (CCD). In addition, the possible significant correlation between these variables and removal efficiency was studied from which the maximum efficiencies were obtained at 5.57 mg/L, 51.49 °C, 0.018 g and 10.73 min corresponding to metal ions concentration, temperature, CSGBiPO₄/FePO₄ and sonication time, respectively. Moreover, at these conditions, the removal percentages of the Cd (II), Ni (II), Pb (II) and Cu (II) ions were found to be 96.24, 93.73, 95.55 and 97.47, respectively. After applying various isotherms, the Langmuir isotherm model was found to be most appropriate model for describing and fitting the experimental equilibrium data and thus maximum mono-layer adsorption capacities of 8.61, 8.54, 8.65 and 8.62 mg/g were obtained for Cd (II), Pb (II), and Cu (II) and Ni (II) ions, respectively. The study of kinetics showed .well applicability of pseudo second order kinetic model with maximum mass transfer rate in adsorption process

کلمات کلیدی:

Bismuth (III) phosphate/iron (III) phosphate nanoparticles; chitosan gel; cloud point;ultrasound irradiation

لینک ثابت مقاله در پایگاه سیویلیکا:

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