



Solid phase extraction of Pb(II) and Cd(II) using reduced graphene oxide-polychloroprene impregnated with magnetic nanoparticle (MNPs-RGO-PCP)

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ABSTRACT

Magnetic solid phase extraction methods for the preconcentration of Pd(II) and Cd(II) was developed by using reduced graphene oxide-polychloroprene impregnated with magnetic nanoparticle (MNPs-RGO-PCP) as an adsorbent. MNPs-RGO-PCP was synthesized and characterized by using Fourier transformation infrared, X-ray diffraction (XRD) and scanning electron microscope. Factors affecting extraction efficiency of the adsorbents such as solution pH, vortex time, adsorbent dose, sample volume and desorption condition were determined and optimized. Analytical parameters such as limit of detection, limit of quantification, linear range, preconcentration factors, enhancement factors and % relative standard deviations were determined under optimized experimental condition. Kinetic study shows that the adsorption of Pb(II) and Cd(II) on MNPs-RGO-PCP follows pseudo-second-order kinetics. The values of thermodynamic parameters such as enthalpy (ΔH°), Gibbs free energy (ΔG°) and entropy (ΔS°) show that the adsorption process is endothermic, spontaneous and feasible in nature. The developed method was applied to certified reference materials such as TMDA 52.2 environmental water, TMDA 62.2 environmental water and SPS-WW2 wastewater with satisfied recovery results. The method was also applied to real environmental samples such as dam water, river water and water from industrial effluent with good addition recovery results.

Keywords: Magnetic solid phase extraction; Polychloroprene; Preconcentration; Impregnated

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