Desalination and Water Treatment
www.deswater.com

doi: 10.5004/dwt.2017.21497

92 (2017) 245–254
October

Comparative solid phase extractions of Pb(II) from water samples using magnetic nanoparticles impregnated banana peels (MNPs-BP), magnetic nanoparticles (MNPs) and banana peels (BP)

Mansoor Khan[a,*], Jasmin Shah[b], Muhammad Rasul Jan[b]

[a]*Department of Chemistry, University of Swabi Anbar, Swabi, Pakistan, Fax: +92-91-9216652; email: mansoor009988@gmail.com*
[b]*Institute of Chemical Sciences, University of Peshawar, Peshawar, Pakistan*

Received 11 May 2017; Accepted 26 September 2017

ABSTRACT

Solid phase extraction method for the preconcentration of Pb(II) from real water samples was developed by using magnetic nanoparticles impregnated banana peel, magnetic nanoparticle and banana peels as adsorbents. The adsorbents were characterized by using scanning electron microscope, energy dispersive X-ray and surface area analyzer. Parameters that influencing % recovery of Pb(II) such as solution pH, adsorbent dose, sample volume, concentration and volume of eluent and matrix effect were determined and optimized. Analytical parameters such as limit of detection, limit of quantification, preconcentration factor, enhancement factor and relative standard deviation were determined under optimized experimental condition. Kinetic data show that this adsorption study follow pseudo-second-order kinetics and the equilibrium data fit to Langmuir adsorption isotherm. The positive values of ΔH , ΔS and negative values of ΔG show that the adsorption process is endothermic, feasible and spontaneous in nature. The method was validated by applying the method to three real water samples with satisfied percent recoveries.

Keywords: Solid phase extraction; Magnetic nanoparticles; Impregnated

* Corresponding author.