

## Magnetic solid phase extraction of Cd (II) using magnetic nanoparticle (MNPs) and silica coated magnetic nanoparticles (SiMNPs) from environmental water samples

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### ABSTRACT

In the present study synthesis of magnetic nanoparticle (MNPs) and silica coated magnetic nanoparticle SiMNPs were carried using co-precipitation method and used for the solid phase extraction of Cd (II) from environmental water samples. MNPs and SiMNPs were characterized using FTIR for surface functional group, SEM for surface morphology, EDX for elemental analysis and SAA for surface area, pore volume and pore size. For quantitative percent recovery various analytical parameter like solution pH, adsorbent dose, volume of sample, eluent type and volume and matrix effect were optimized. Limit of detection (LOD) like  $0.30 \mu\text{g L}^{-1}$  and  $0.31 \mu\text{g L}^{-1}$  for SiMNPs and MNPs values shows that the method is highly sensitive. The kinetic data shows that the adsorption of Cd (II) on MNPs and SiMNPs follows pseudo second order kinetics. Values of  $\Delta H^\circ$ ,  $\Delta S^\circ$  and  $\Delta G^\circ$  show that these adsorption processes are exothermic and feasible in nature. For equilibrium studies different isotherms like Langmuir, Freundlich, Temkin and D-R adsorption isotherms were applied. The method was successfully applied to environmental water samples like Tap water and River water with satisfied recovery results.

*Keywords:* Solid phase extraction; Magnetic nanoparticle; Co-precipitation; Preconcentration

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