

Preconcentration and Separation of Zn²⁺ Using Surface Zinc(II) Imprinted Functionalized Silica Gel Sorbent

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Zinc(II) imprinted amino-functionalized silica gel sorbent was synthesized applying surface-imprinting technique in order to preconcentrate and separate Zn²⁺ prior to its determination by inductively coupled plasma optical emission spectrometry (ICP–OES). Compared to traditional solid sorbents and non-imprinted sorbent, zinc(II)-imprinted sorbent has higher selectivity and adsorption capacity towards Zn²⁺. Maximum static adsorption capacities of ion-imprinted and non-imprinted sorbent towards Zn²⁺ were 12.98 mg g⁻¹ and 4.36 mg g⁻¹, respectively. The largest separation factor for zinc(II) imprinted sorbent towards Zn²⁺ in the presence of Hg²⁺ was higher than 188. Relative selectivity coefficient (α_r) values for Zn²⁺/Hg²⁺ pair were 15.5 and 13.8 – both greater than 1. Distribution coefficient (D) values of zinc(II) imprinted polymers towards Zn²⁺ were greatly larger than those for Hg²⁺. Detection limit (3 σ) of the method was 0.29 $\mu\text{g L}^{-1}$ and relative standard deviation equalled 2.6% for eight replicate determination of 10 μg of Zn²⁺ in 200 mL-in-volume water sample. The proposed method was applied to the determination of trace zinc in biological and water samples with satisfactory results.