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Magnetically separable polymer (Mag-MIP) for selective analysis of biotin in food samples

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Abstract

This work presents an efficient method for the preparation of magnetic nanoparticles modified with molecularly imprinted polymers (Mag-MIP) through core-shell method for the determination of biotin in milk food samples. The functional monomer acrylic acid was selected from molecular modeling, EGDMA was used as cross-linking monomer and AIBN as radical initiator. The Mag-MIP and Mag-NIP were characterized by FTIR, magnetic hysteresis, XRD, SEM and N₂-sorption measurements. The capacity of Mag-MIP for biotin adsorption, its kinetics and selectivity were studied in detail. The adsorption data was well described by Freundlich isotherm model with adsorption equilibrium constant (KF) of 1.46 mL g⁻¹. The selectivity experiments revealed that prepared Mag-MIP had higher selectivity toward biotin compared to other molecules with different chemical structure. The material was successfully applied for the determination of biotin in diverse milk samples using HPLC for quantification of the analyte, obtaining the mean value of 87.4% recovery.

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Thus, it is possible to determine the amount of adsorbed material. The value of Q was calculated by Eq. (1)[31]

Synthesis and evaluation of a molecularly imprinted polymer for selective adsorption and quantification of Acid Green 16 textile dye in water samples

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