-Fabrication of Water Compatible and Biodegradable Super Paramagnetic Molecularly Imprinted Nanoparticles for Selective Separation of Memantine from Human Serum Prior to its Quantification: An Efficient and Green Pathway

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Abstract:

A novel green magnetic molecularly imprinted solid phase extraction (MMI-SPE) for separation of memantine (MEM) from complicated matrices was proposed. The nanomaterial was synthesized via crosslinking of chitosan (CHIT) with [3-(2, 3-epoxypropoxy)-propyl] trimethoxysilane (EPPTMS) in presence of MEM as a template. The nanocomposites, in all steps, were characterized by SEM, FTIR and PXRD techniques. The adsorbed drug was removed from magnetic molecular imprinted polymer (MMIP) cavity by ethanol: acetic acid (8:2, v/v) and then, coupled with sodium 1,2-naphthoquinone-4-sulphonate (NQS) in iodine/alkaline medium to yield highly fluorescent product, after reduction with potassium borohydride (KBH4). Variables affecting extraction of MEM from imprinted sites and its fluorometric analysis were studied. The linearity was achieved over concentration range of 1.84–95.0 ng mL⁻¹ with LOD of 0.6 ng mL⁻¹. The method was successfully applied for determination of MEM in its pharmaceutical tablets and human serum with recoveries of 100.8 ± 3.0, 97.6 ± 2.9, respectively.

Keywords:

Memantine, Magnetic molecular imprinted polymer, Sodium 1, 2-naphthoquinone 4-sulphonate, Fluorimetry, Human serum

Published In: