DESIGN AND PREPARATION OF MOLECULARLY IMPRINTED POLYMERS FOR SELECTIVE EXTRACTION OF GALLIC ACID

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Gallic acid (GA) (3,4,5-trihydroxybenzoic acid) is an important polyhydroxyphenolic compound present in tea leaves, nuts, sumac, grapes, berries, bananas, lemons, mango and wine. Also found in olive mill waste water. GA is commonly used as a reference standard material in the Folin–Ciocalteau assay for determine the total phenol concentration. GA reduces oxidative stress damages and can also inhibit the polyunsaturated fatty acid saturation. GA possesses many beneficial effects including antioxidant, antibacterial, antiviral, anti-inflammatory, antidiabetic, antiparkinson activity, anticarcinogenic properties and it protect against cardiovascular diseases. For that reason, development of robust, sensitive and specific determination and extraction of GA is important. Several methods, such as HPLC, LC/MS-MS, flow injection chemiluminescent analysis, reverse flow spectrophotometry, resonance light scattering, chemiluminescence and electrochemical techniques have been applied for GA detection.1,2

Molecular imprinting is a methodology for the introduction of selective recognition sites into highly cross-linked polymeric matrices, via the template-directed assembly of functionalized monomers into a polymer network. The monomers interact with sites on the template via covalent or non-covalent interactions. The prepared molecularly imprinted polymers (MIPs) exhibit high selectivity, excellent mechanical strength and additional advantages of reusability and low-cost. Synthesis and use of molecularly imprinted polymers are important for separation of target compound from complex mixtures. The inherent selectivity associated with molecularly-imprinted polymers (MIPs) has made these materials efficient for SPE; this combination has been successfully employed for extraction and preconcentration of analytes from different samples.3,4

In this work, GA selective memories were formed on nanoparticle surface by using a new metal–chelate interaction between pre-organized functional monomer and GA. Selective recognition behaviour of these molecular memories toward GA via molecular imprinting process was investigated. We also investigated the adsorption capacity, adsorption isotherms and reusability of the prepared MIP nanoparticles for the selective extraction of GA.

References