A Novel Synthesis of a Magnetic Porous Imprinted Polymer by Polyol Method Coupled with Electrochemical Biomimetic Sensor for the Detection of Folate in Food Samples

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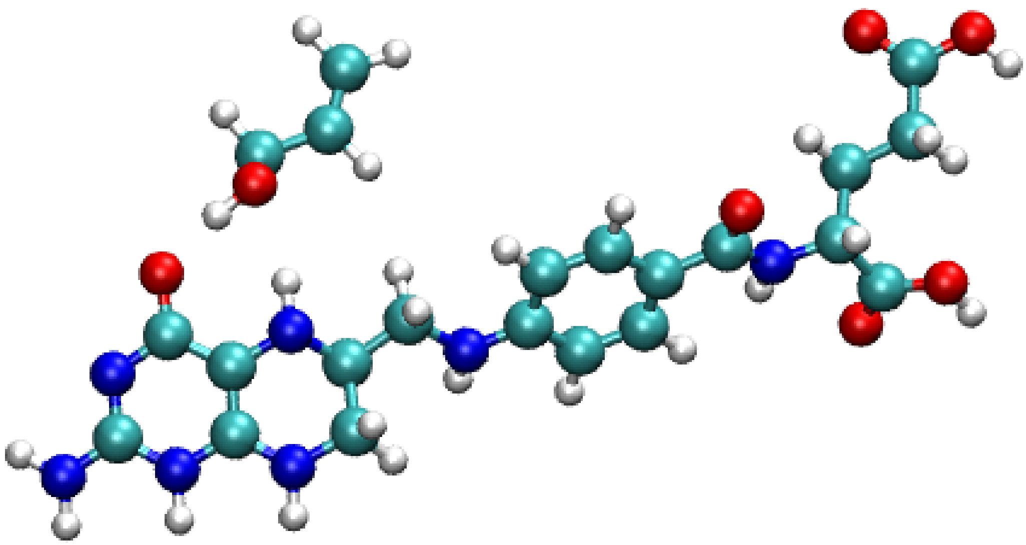

Figure S1. (a) Fundamental) three-dimensional structural formula.

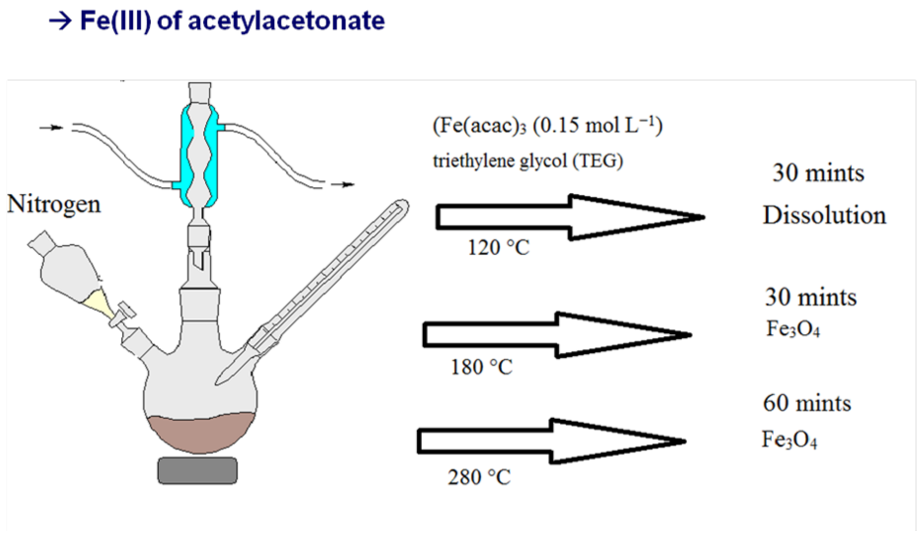

Figure S2. Experimental parameters applied in the formation of magnetite nanoparticles prepared by the polyol method.

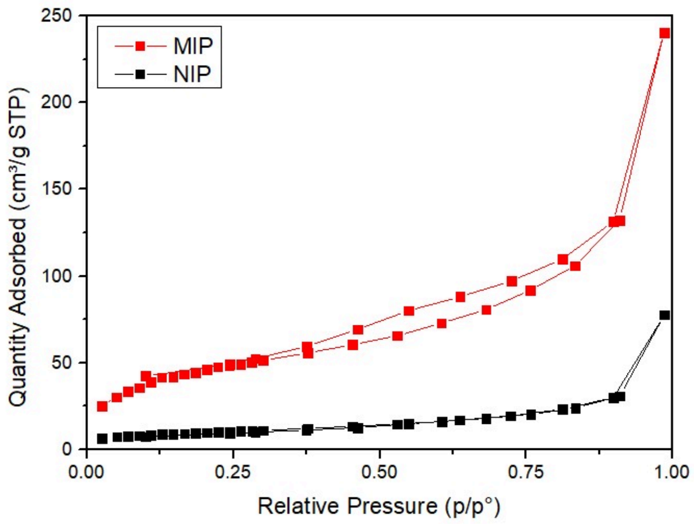

Figure S3. The plots about nitrogen adsorption.

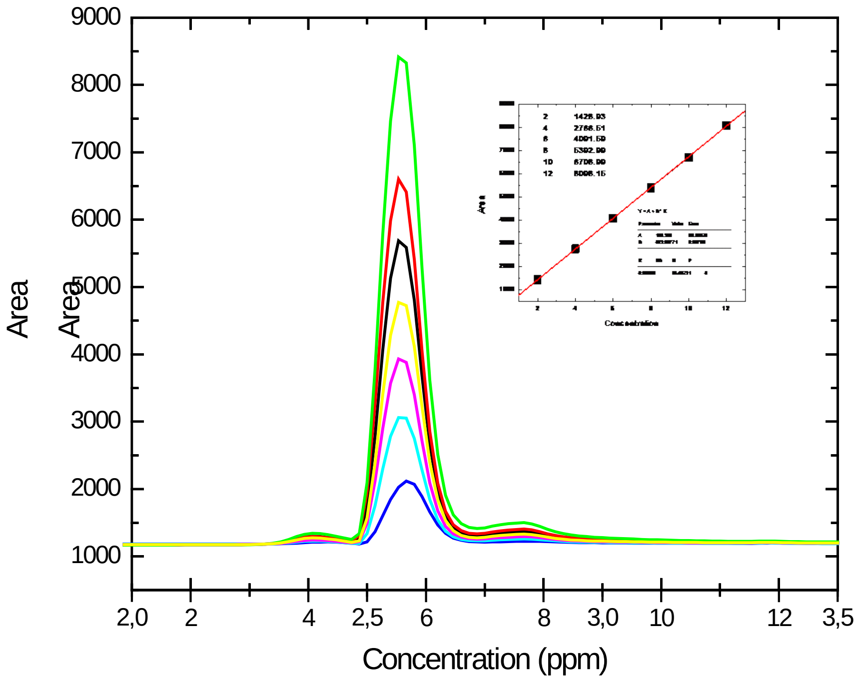

Figure S4. Analytical curve obtained from the application of the HPLC-UV method for the determination of different concentrations of folate. Analysis conditions: 0.1% phosphoric acid in a solution containing water and methanol; flow rate of 0.8 mL min^{-1}; column temperature of 25 °C; detection wavelength of 280 nm. Gradient elution: 0–7 min.

Electrochemical profile by ciclyc voltammetry

A thorough analysis of the electrochemical performance of the electrodes was conducted by cyclic voltammetry (CV) using carbon paste electrode (CPE), MNIPs/CPE, and MMIPs/CPE in the presence of 1.1 $\times 10^{-5}$ mol L^{-1} folate solution. Figure S5 shows the results obtained from this analysis. As can be observed, the MMIPs/CPE sensor exhibited the best electrochemical response, with electrochemical signal 4.0 times greater than that of the MNIPs/CPE sensor and much higher than that of the CPE. The significant increase in the signal of the MMIPs/CPE is attributed to the excellent interaction between the specific cavities (with a high surface area) present in the polymeric material and the analyte in the solution. The outstanding performance of the MMIPs/CPE can thus be linked to its highly selective adsorption of the analyte; the CPE exhibited no such behavior, while the MNIPs/CPE exhibited low adsorption.

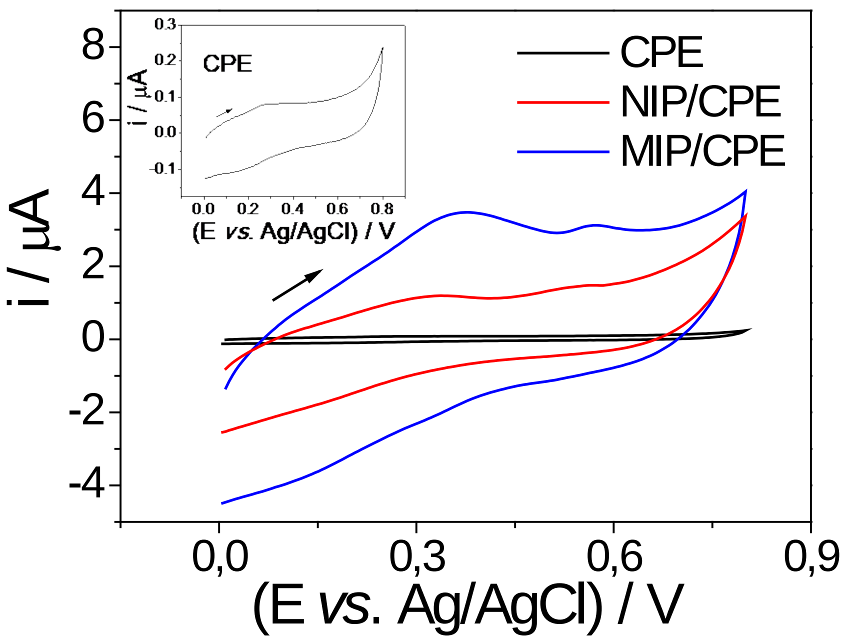

Figure S5. Cyclic voltammograms obtained from the application of different electrodes. Measurements were performed using scan rate= 50 mVs^{-1}, acetate buffer solution (at pH 4.0) in the presence of 1.1 × 10^{-5} mol L^{-1} folate.

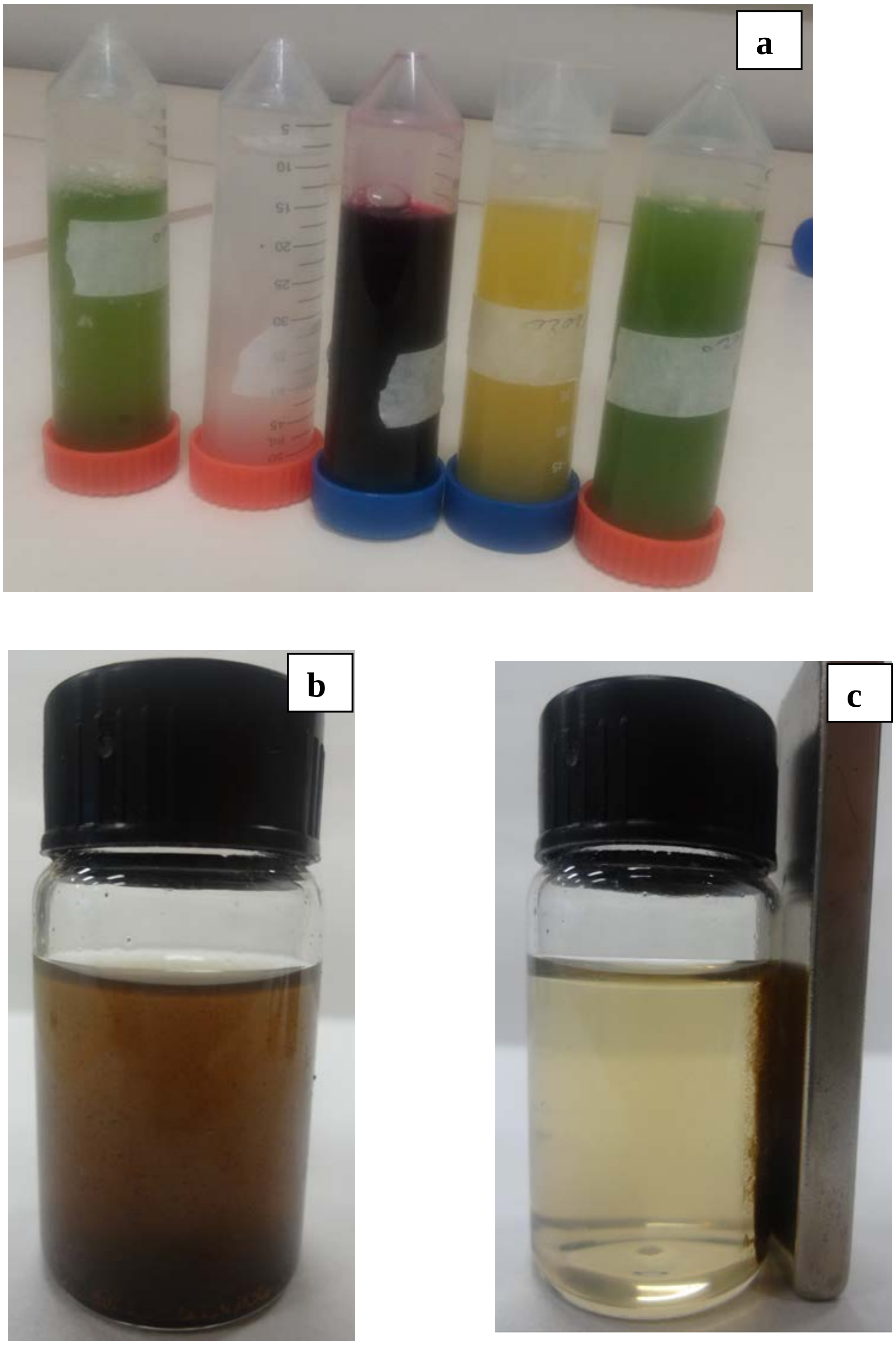

Figure S6. Analysis of real samples based on the application of the MIP/CPE sensor using different food samples. (a) Real food samples; (b) MMIPs before magnetic separation; (c) MMIPs after magnetic separation

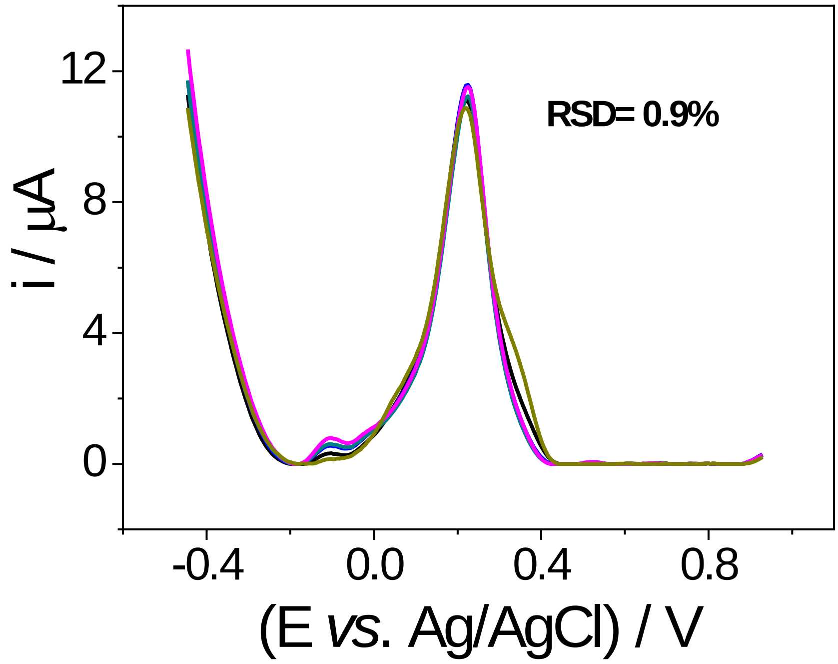

Figure S7: Electrochemical determination of folate by SWV using the mag-MIP/CPE sensor. Analysis conditions: 0.1 mol L^{-1} acetate buffer solution (pH 4.0). SWV conditions: f = 15 Hz, a = 75 mV, ΔEs = 5 Mv, and folate concentration = 2.7×10^{-5} mol L^{-1}.

Table S1. Optimized parameters of SWV for detection of folate

Parameter	**Range**	**Optimum value**
Amplitude (mV)	25 - 100	75
Step (mV)	2 - 6	5
Frequency (Hz)	8 - 30	15

Table S2. Application of MMIPs for selective extraction of analytes from real samples

	Contaminations	Limit of Detection linear dynamic range	Matrix	Ref
Analyte	Folic acid	10nM, 0.01 μM-100 μM	Human serum	[1]
	Folic acid	2.7 × 10–8 M $6 \times 10^{-8} - 8 \times 10^{-5}$ M	Biological specimens	[2]
	Folic acid	0.01 μM 0.05–1.5 μM	Fortified food and pharmaceutical samples	[3]
	Folic acid	0.05 μM 0.08 to 650 μM	vitamin B9 tablets Mint leaves	[4]
	Folic acid	2.40 ± 0.9) × 10^{-9} M 5.0 × 10^{-7} to 9.0 × 10^{-6} M	fruit juices, human blood serum, and pharmaceuticals	[5]

References

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