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ELECTRONIC SUPPORTING INFORMATION

Homopolymerization of 3-aminobenzoic acid for enzymeless electrocatalytic assay of nitrite

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S1: Electropolymerization Optimization

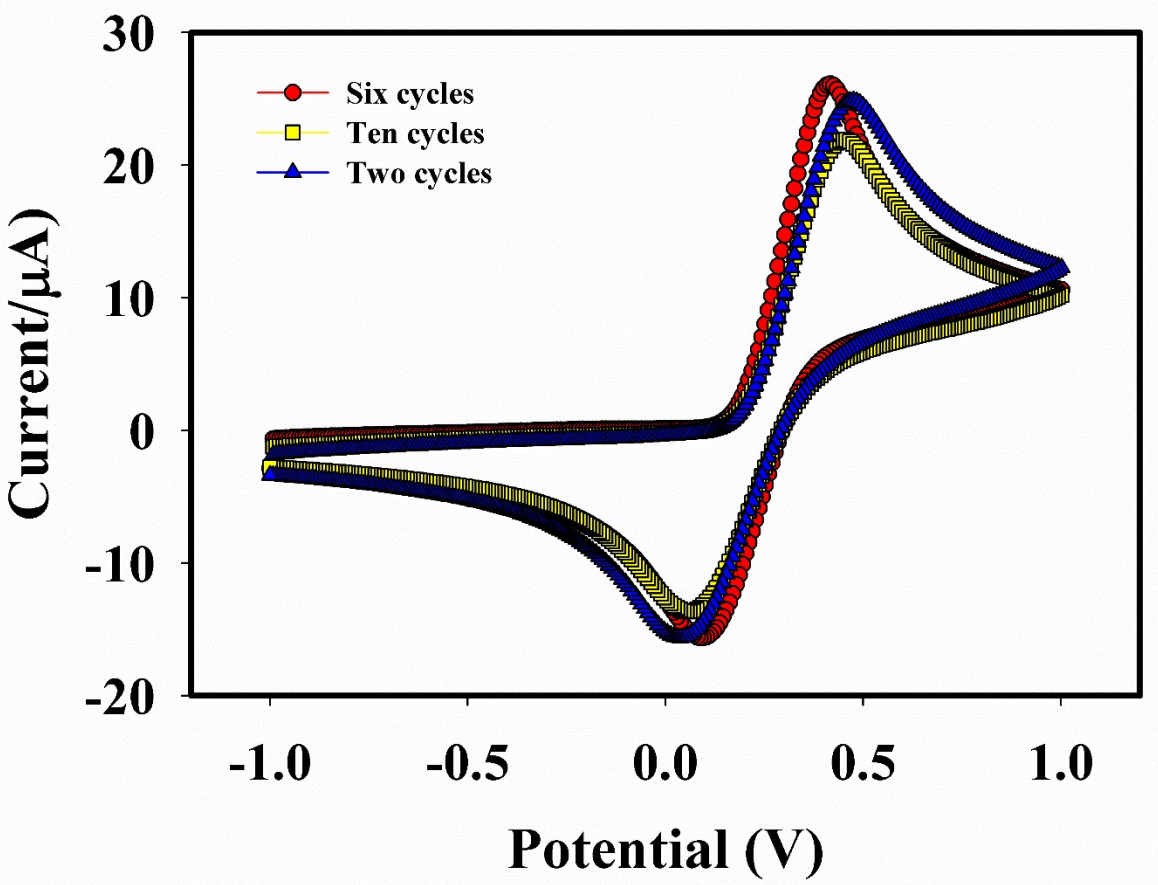

Fig.S1: cyclic voltametric behaviour of poly (3-aminobenzoic acid) synthesized at different number of voltammetric cycles or sweep in 0.1mM Fe $(CN)_6^{3-/4-}$

Table S1: The oxidation current of PABA synthesized by varying number of cyclic voltammetric sweep.

No of cycles	Oxidation peak current (µA)	Oxidation potential (V)
2	21.9073	0.4501
6	26.0771	0.4172
10	24.8391	0.4749

S2: Results of XPS analysis

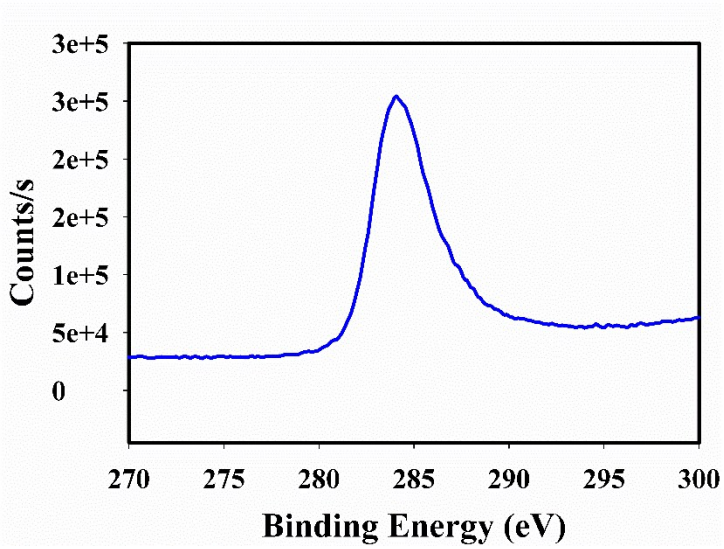

Fig.S2a. XPS spectra for C1s.

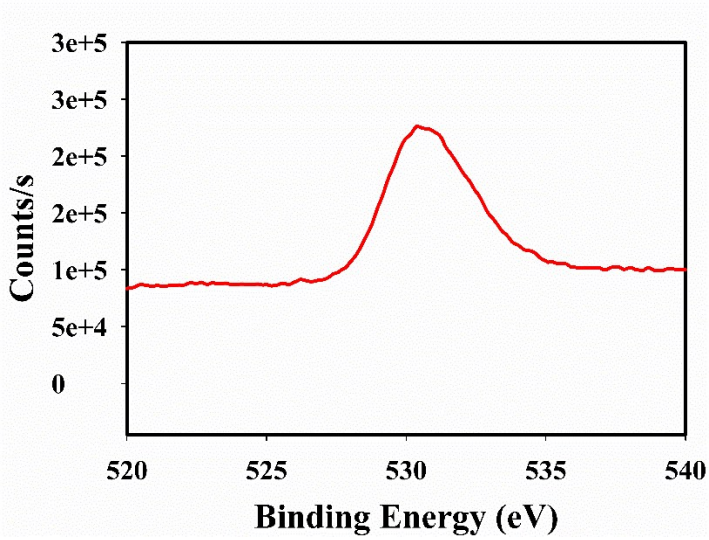

Fig.S2b. XPS spectra for O1s

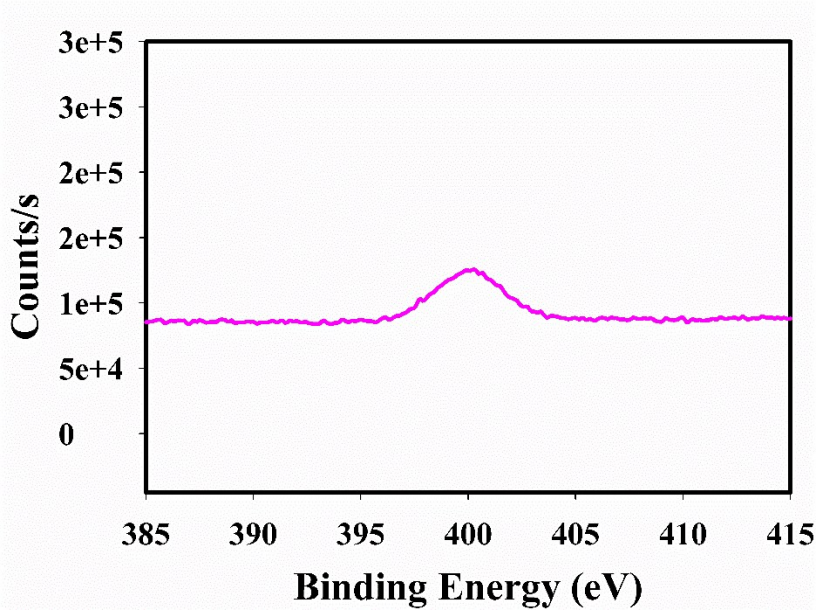

Fig.S2c.XPS spectrum showing N1s

S3: Supporting electrolyte (PBS) variation and optimization

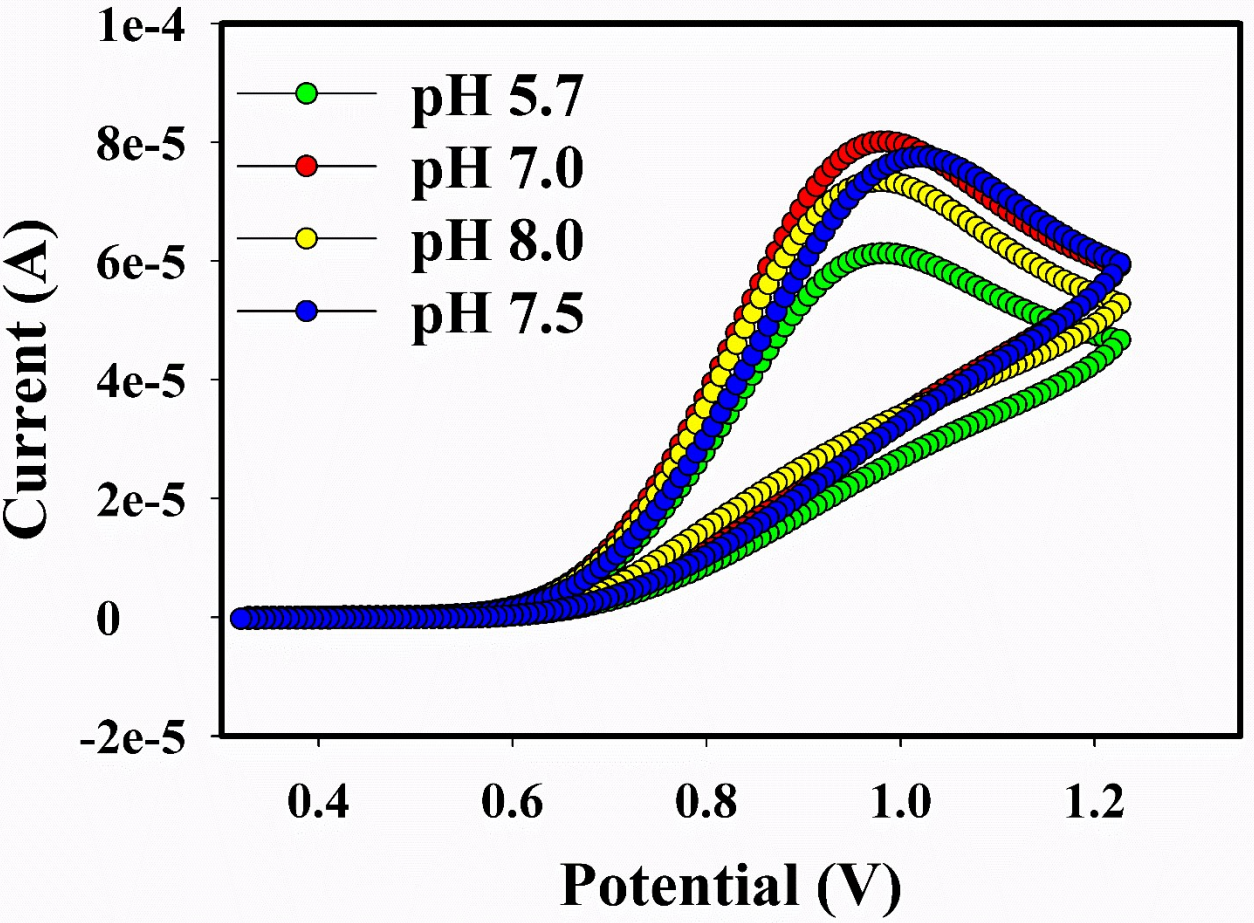

Fig. S3: Effect of pH variation on oxidation current response of PABA in 0.25mM NO_2^-

S4: Analytical performance parameters

Limit of Detection (LOD)

This was calculated using the equation;

$$LOD = \frac{3 \times SD}{\text{Slope of the calibration plot}}$$

where SD is the standard deviation of the blank response.

From our results, LOD = 3 x 1.53 x 10^{-8}/0.3 = 0.15µM

Limit of Quantification (LOQ)

This was determined using the equation.

$$LOQ = \frac{10 \times SD}{\text{Slope of the calibration plot}}$$

LOQ = 10 x 1.53 x 10^{-8}/0.3 = 0.51µM

Sensitivity

This was calculated using the formula:

$$\textbf{Sensitivity} = \frac{\textbf{Slope of the calibration plot}}{\textbf{GCE surface area}}$$

Sensitivity = 0.3 µAµM-1 / 0.2cm2 = 1.53µAµM^{-1}cm^{-2}

Linear dynamic range (LDR)

The calibration plot was linear till addition of 140µM

Full dynamic range (FDR)

The full calibration range was 10-140µM

S4-1: Kinetic studies of detection of nitrite on poly(3-ABA) modified GCE

Tafel slope:

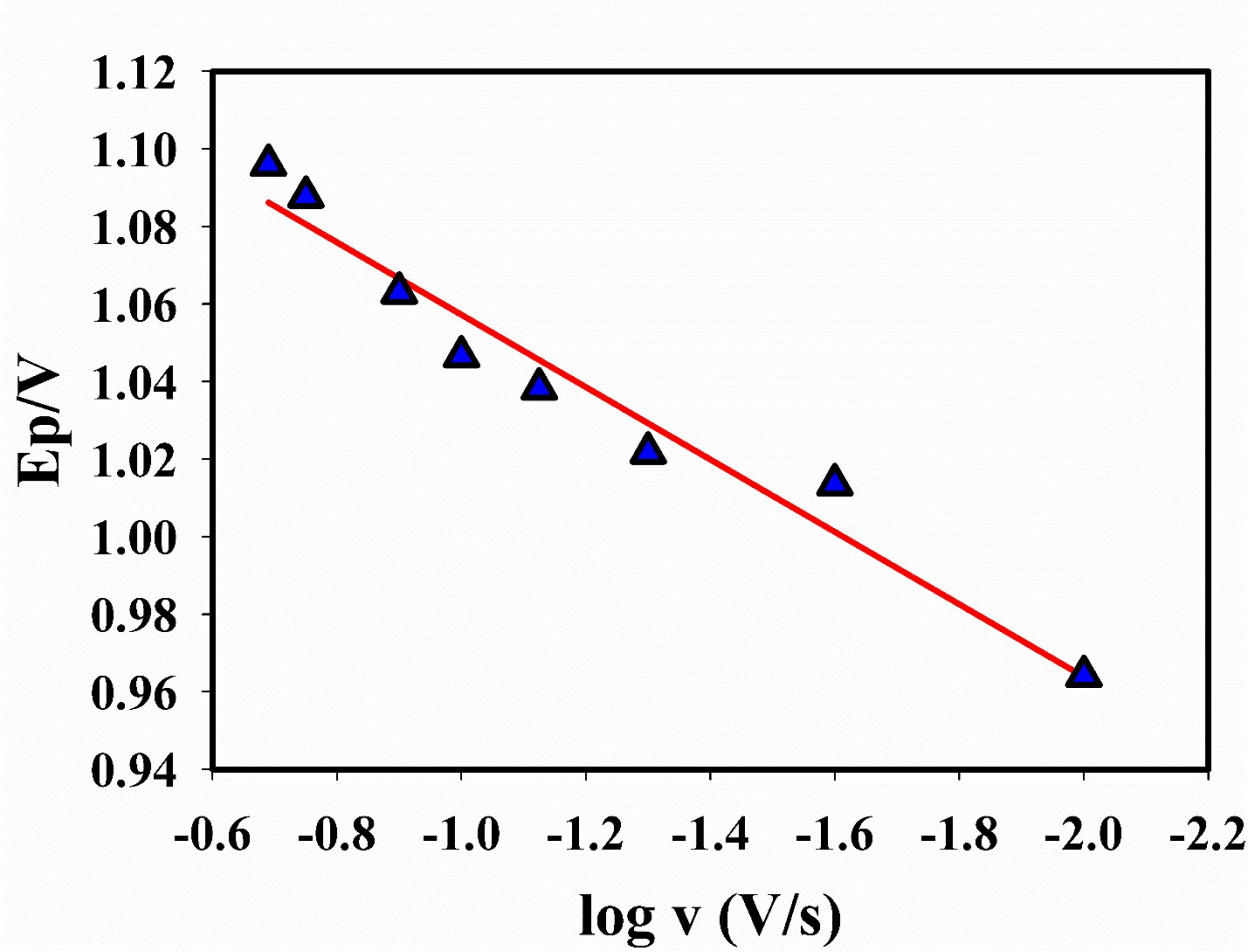

Figure S4a: Plot of peak potential against logarithm of the scan rate.

The equation of the plot:

E_p (V) = 0.03 × log υ (V/s) + 1.16

$E_p = \frac{b(log v)}{2} + C.$

Using the slope of the plot and the equation given above, Tafel slope is calculated as:

b = 60mV/dec.

Charge transfer coefficient (α)

$$\alpha = \frac{47.7}{(Ep - \frac{Ep}{2})} mV$$

= 47.7/(950-850) mV

= 47.7/100 = 0.47

Diffusion coefficient (D)

D was calculated using Randles sevcik equation

$i_p = 2.69 \times 10^5$ A $n^{3/2}$ C $D^{1/2} \upsilon^{1/2}$

D = 4.65×10^{-8} cm^2/s

S4-2: Stability Assessment

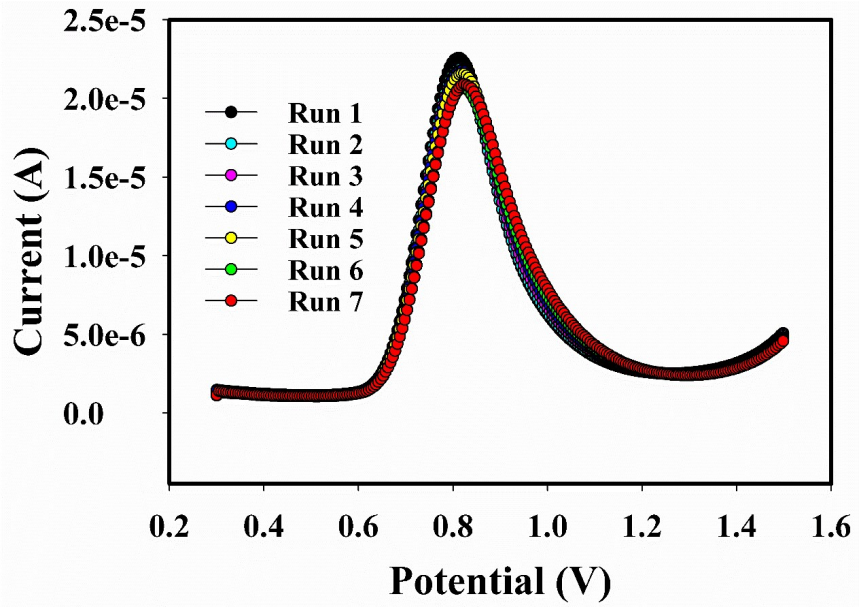

Fig. S4b: The current response of PABA in 60µM NO_2^- for seven consecutive readings

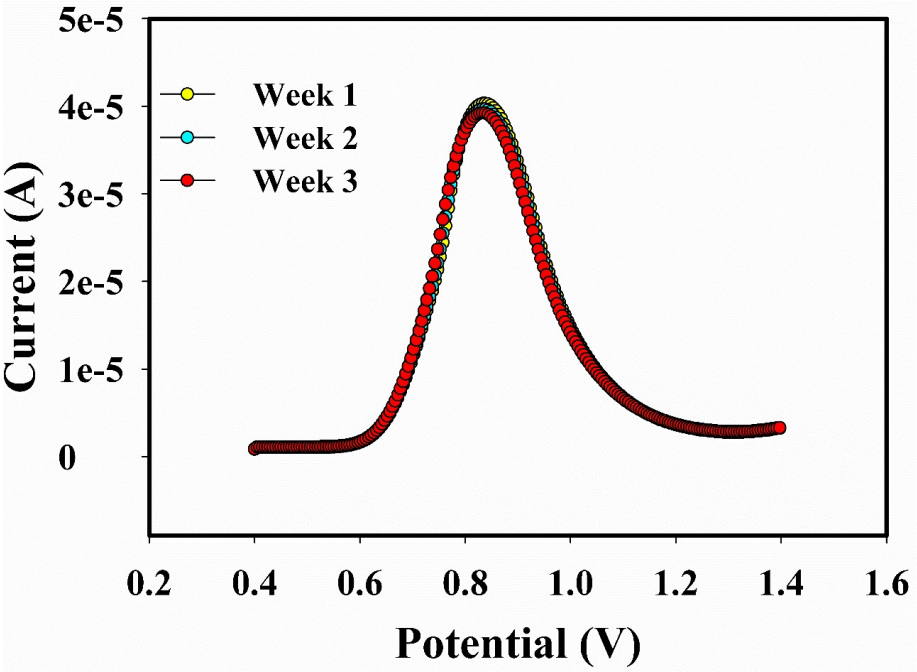

Fig. S4c: The current response of PABA in 120µM NO_2^- for three consecutive weeks

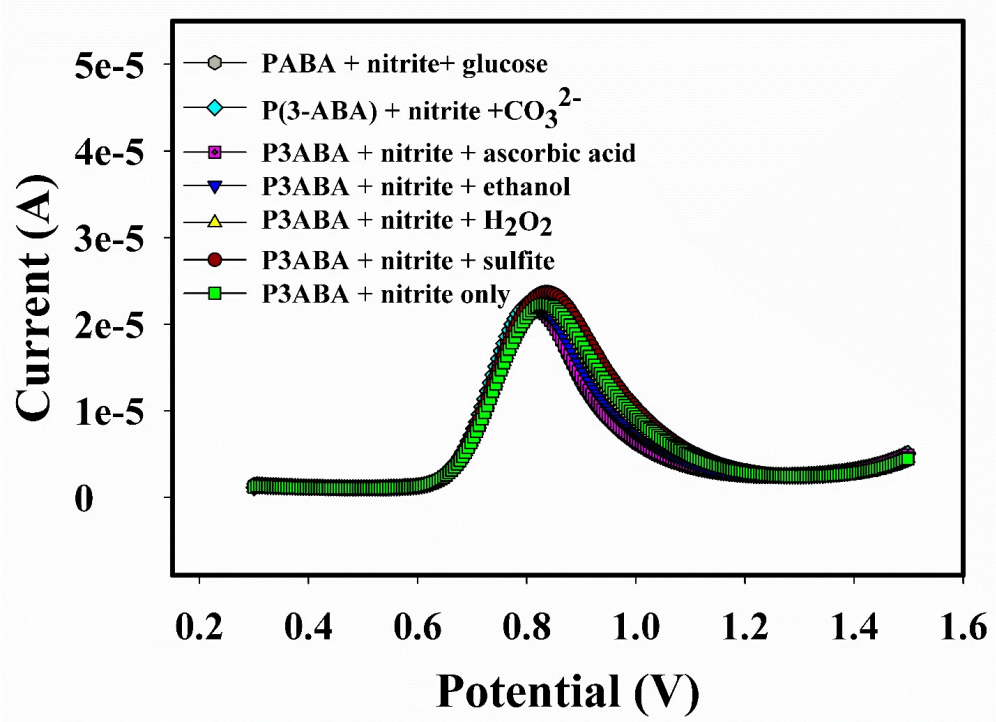

Fig.S4d. Current response of poly(3-ABA) in 60µM nitrite in the absence and presence of likely interferents (same fold concentration)

S5: Statistical Analysis

Repeatability measurements

The oxidation peak currents: 2.2568e-5, 2.1857e-5, 2.1738e-5, 2.1747e-5, 2.1588e-5, 2.0660e-5 and 2.0898e-5.

Mean value = 2.153e-5

$$\text{Standard deviation, } \sigma = \sqrt{\frac{\Sigma (X - \bar{X})^2}{n-1}}$$

Sd = 6.142e-7

$$Relative\ standard\ deviation\ (RSD)\% = \frac{Sd}{X\ (mean\ value)} \times 100$$

$$= \frac{6.142\ e-7}{2.15\ e-5} \times 100$$

= 2.86%

Reproducibility measurement

The oxidation peak currents obtained are:

4.0314e-5; 3.9246e-5 and 3.9703e-5

Mean = 3.98e-5

$$\text{RSD}\ \% = \frac{4.38\ e-7}{3.98\ e-5} \times 100$$

= 1.01%

Interference

The oxidation peak currents recorded were:

2.186e-5 (nitrite only), 2.368e-5, 2.173e-5, 2.188e-5, 2.186e-5, 2.168e-5, 2.170e-5

Mean value = 2.201e-5

Sd = 1.36×10^{-6}

$$\text{RSD}\ \% = \frac{1.36\ e-6}{2.201\ e-5} \times 100$$

= 2.95%

S6: Real sample analysis

Method used: Standard addition.

$$Recovery\ (\%) = \frac{Ci - Co}{Cs}$$

Where Ci is the total concentration of analyte, Co is concentration of analyte (before spike), Cs is the concentration of the spiked nitrite