Assessment of human paraoxonase activity by electrochemistry: a simple and novel approach

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Supplementary Information

Deduction of the paraoxonase reaction rate – Equation 2

a) The cathodic peak intensity (I_p) is directly proportional to paraoxon's concentration ([S]) according to $I_p = a \times [S]$, where *a* is the slope of the I_p vs [S] calibration curve (cf. Fig. 1b).

When [S] = $[S]_0$ then $I_{p0} = a \times [S]_0 \Rightarrow a = \frac{I_{p0}}{[S]_0}$.

b) The rate equation for the paraoxonase reaction is written as $v_0 = \frac{\Delta[S]}{\Delta t}$, where [S] can be substituted by the correlation defined in a), accordingly:

$$v_0 = \frac{[S]_t - [S]_0}{t - t_0} \Rightarrow v_0 = \frac{\frac{I_{pt}}{a} - \frac{I_{p0}}{a}}{t - t_0} \Leftrightarrow v_0 = \frac{1}{a} \times \frac{I_{pt} - I_{p0}}{t - t_0} \Rightarrow v_0 = \frac{[S]_0}{I_{p0}} \times \frac{I_{pt} - I_{p0}}{t - t_0} \Leftrightarrow v_0 = \frac{[S]_0}{I_{p0}} \times \frac{\Delta I_p}{\Delta t}$$

c) Taking into account the substrate's non-catalytic hydrolysis, the final equation is written as:

$$v_0 = \left(\frac{[S]_0}{I_{p0}} \times \frac{\Delta I_p}{\Delta t}\right) - \left(\frac{[S]_0}{I_{p0}} \times \frac{\Delta I_p}{\Delta t}\right)_{without\ enzyme}$$

a – Slope of the I_p vs [S] curve (A M^{-1})

I_p – Peak current intensity (A)

[S] – Substrate (paraoxon) concentration (M)

t – Reaction time (s)

v_0 – Reaction rate (M s^{-1})