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Electrochemical behavior study of salicylic acid following azo dye formation with 2,4-dinitrophenylhydrazine: Analytical evaluation

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A new simple, accurate and cost-effective chronoamperometry (CA) based approach coupled with azo coupling reaction has been put forward for quantitative analysis of salicylic acid. The reaction involves a two-step process of oxidation of the 2,4-dinitrophenylhydrazine (DNPH) by potassium iodate to give a 2,4-dinitrophenylhydrazinium cation at 0–5°C and coupling with salicylic acid (SA) to form red salicylic acid-derived azo dye. Electrochemical impedance spectroscopy, square wave voltammetry and chronoamperometry methods were used to characterize the electrochemical behavior of the salicylic acid-derived azo dye. Studies on different variables affecting the reaction were optimized. Under the optimal conditions, amperometric studies showed that the current response exhibits a wide linearity range from 0.1 to 0.0005 mmolL⁻¹ for SA and the limit of detection and quantification are found to be 0.0001 and 0.0015 mmolL⁻¹ (S/N = 3 & 10) respectively. Therefore, the developed method was successfully applied for routine determination of SA in pharmaceutical samples.

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