

Oxidative-Coupling Reaction-Based Sensitive Determination of Dopamine at Glassy Carbon Electrode Using Chronoamperometry

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A simple and rapid method based on oxidative-coupling reaction for determination of dopamine using chronoamperometry was developed. Based on oxidative-coupling reaction, dopamine was transformed into red azo dye by reacting with 2,4-dinitrophenylhydrazine (DNPH) oxidized. Subsequently, the concentration of dopamine can be determined indirectly from azo dye. Taking account of the advantage of their low-cost and the convenience in manipulation, chronoamperometry was employed to investigate the response of dopamine-derived azo dye. Square wave voltammetry and impedimetric studies were done to characterize the dopamine-derived azo dye. Various factors that influence reaction and amperometric intensity were investigated. Under the optimal conditions, the linearity was observed in the range of 0.1–0.0005 mmol L⁻¹ with good correlation coefficient ($R^2= 0.9793$). The relative standard deviation (RSDs) for five replicate measurements 3.37 %. The limit of detections of the method (S/N=3) was 0.02.36 mmol L⁻¹. The performance of the proposed method to determine the concentration of dopamine in pharmaceuticals samples was evaluated.

Keywords: dopamine; coupling reaction; DNPH; chronoamperometry.