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An electroanalytical method for the determination of phentolamine mesilate at a PSS-MWCNT modified glassy carbon electrode

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Abstract:

This paper reports a simple approach for the determination of phentolamine mesilate (PM) using a poly(sodium p-styrenesulfonate)-multi-wall carbon nanotube (PSS-MWCNT) modified glassy carbon electrode. PSS-MWCNTs were synthesised via a moderate one-step non-covalent reaction between MWCNTs and PSS. Compared with purified MWCNTs (p-MWCNTs), the introduction of PSS improved the dispersion of MWCNTs and increased the accumulation capability of PM. As a result, the detection sensitivity for PM was greatly enhanced at this voltammetric sensor. The electrochemical properties of PM were first investigated in detail and a reaction mechanism was proposed. Utilizing linear sweep voltammetry, a low detection limit (3.0×10^{-8} mol L⁻¹) and a wide linear range (8.0×10^{-8} mol L⁻¹ – 6.0×10^{-6} mol L⁻¹) were achieved by the proposed sensor. Finally, the proposed method was successfully applied to the analysis of real-life samples.

Keywords: Phentolamine mesilate; Multi-wall carbon nanotubes; Poly(sodium p-styrenesulfonate); Electrochemical sensor

1. Introduction

Phentolamine mesilate (PM) is a non-selective α receptor blocker. It can expand blood vessels to reduce the peripheral vascular resistance, and increase the peripheral vascular blood flow [1]. In view of its pharmacological effects, it is widely used in treatment of primary pulmonary hypertension [1], congestive heart failure [2], and pheochromocytoma [3, 4]. In addition, PM can relax the smooth muscle of corpus cavernosum, and facilitate more blood to

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