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<AT>Voltammetric determination of epinephrine and xanthine based on sodium dodecyl sulphate assisted tungsten trioxide nanoparticles

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<ABS-Head><ABS-HEAD>Graphical abstract

<ABS-P>► The gamma ray irradiated (50 kGy) sodium dodecyl sulphate (SDS) assisted tungsten trioxide (WO₃) nanoparticles with columnar polyhedron morphology acts as an excellent electrocatalyst which remarkably manifested the simultaneous determination of epinephrine and xanthine.

<ABS-HEAD>Highlights► A novel electrochemical sensor has been developed for the simultaneous determination of epinephrine and xanthine based on gamma irradiated SDS-WO₃ NPs for the first time. ► The fabricated sensor exhibits wide linear range (0.009-1000 µM), low detection limit (1.8 nM for EP and 2.2 nM for XA), good stability and reproducibility. ► The proposed method was successfully applied to the analysis of human serum samples with satisfactory results.

<ABS-HEAD>ABSTRACT

<ABS-P>This work reports the voltammetric determination of epinephrine (EP) and xanthine (XA) using gamma irradiated tungsten trioxide (WO₃) nanoparticles. WO₃ NPs synthesized by anionic surfactant sodium dodecyl sulphate (SDS) assisted template method was subjected to gamma rays under different doses (0-150 kGy). The experimental results revealed that the 50 kGy irradiation on SDS-WO₃ NPs led to significant changes in crystallite size and morphology which enriched its electrocatalytic activity greatly. The electrochemical behaviors of EP and XA at 50 kGy SDS-WO₃ modified glassy carbon electrodes (GCE) were studied by cyclic voltammetry and differential pulse voltammetry. The outcomes confirmed that the proposed electrode demonstrate excellent electrocatalytic activity towards the oxidation of EP and XA in phosphate buffer solution (PBS, pH 7.0). The fabricated electrode possess lowest detection limit of 1.8 nM and 2.2 nM for EP and XA respectively with the very wide dynamic linear range of 9 nM to 1 mM. Finally, the modified sensor was successfully implemented to detect EP and XA in the human serum samples with excellent selectivity, good stability and reproducibility.

<KWD>Keywords: Tungsten trioxide; SDS; Gamma irradiation; Epinephrine; Xanthine;

Electrochemical sensor.

<H1>1. Introduction

Epinephrine (4-[(1R)-1-Hydroxy-2-(methylamino) ethyl]-1,2-benzenediol, EP) also known as adrenaline, is an essential endocrine hormone released from the adrenal gland which play vital role on glycogen metabolism and nervous system [1,2]. In adults, the concentration of EP are

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