

Electrochemical detection of gliclazide and glibenclamide on ZnIn₂S₄ nanoparticles-modified carbon ionic liquid electrode

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ABSTRACT

This research introduces a new modification of carbon paste electrode (CPE) by ZnIn₂S₄ nanoparticles (ZIS) and an ionic liquid (1-butyl-3-methylimidazolium hexafluorophosphate, (BMIM.PF₆)) as a sensitive sensor for voltammetric detection of gliclazide and glibenclamide compared to unmodified carbon paste electrode. The modified electrode (ZISILCPE) was characterized by different techniques such as cyclic voltammetry (CV), differential pulse voltammetry (DPV) and chronoamperometry (CHA). The electrochemical parameters of gliclazide were studied on the modified electrode surface. It was revealed that the performance of ZISILCPE sensor toward electrochemical detection of gliclazide and glibenclamide has significantly improved, in aqueous solution. The electrocatalytic features of the modified sensor were further exploited for the detection of gliclazide by DPV as a sensitive detection method. The sensor showed two well-expressed voltammetric peaks for two targets, and successfully resolved the overlap of corresponding voltammetric responses. Based on DPV, there was a linear increase for the peak currents from gliclazide and glibenclamide respectively with their concentrations ranging from 7.5×10^{-7} – 5.0×10^{-4} M to 1.0×10^{-6} – 8.0×10^{-4} M. According to the ZISILCPE, gliclazide and glibenclamide demonstrated the detection limits of 1.2×10^{-7} M and 8.0×10^{-7} M, respectively. The offered protocol was also efficient to detect two analytes in pharmaceuticals and urine samples.

KEYWORDS

Gliclazide; Glibenclamide; Ionic liquid; ZnIn₂S₄nanoparticles; Carbon paste electrode

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