

Carbon Paste Electrode with Au/Pd/MWCNT Nanocomposite for Nanomolar Determination of Timolol

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Fabrication of Au/Pd/MWCNT nanocomposite was performed by using chemical method. The nanocomposite was characterized by scanning electron microscopy (SEM), energy-dispersive X-Ray spectroscopy (EDS) and electrochemical methods. Palladium and gold nanoparticles were dispersed in multi-walled carbon nanotubes (MWCNT). The Au/Pd/MWCNT nanocomposite was applied as a modifier in carbon paste electrode for electro-oxidation of timolol. This modified electrode displayed high efficiency for sub-micromolar determination of timolol maleate. The effect of pH of the buffered solutions and potential sweep rate on the response of the electrode for the oxidation of timolol were investigated. Differential pulse voltammetry was used for quantitative determination. Dynamic linear ranges were obtained in the two ranges of 1.0×10^{-5} - 1.0×10^{-3} M and 5.0×10^{-9} - 8.0×10^{-7} M and the detection limit was estimated to be 5.8×10^{-11} M. The practical utility of this modified electrode was investigated by detecting timolol maleate in pharmaceutical sample (eye drop) and synthetic serum.

Keywords: Timolol maleate, Pd nanoparticles, Au nanoparticles, Multi-walled carbon nanotubes, Voltammetric sensor

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