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Facile Simultaneous Determination of Hydroquinone and Catechol Using Nitrogen-doped Graphene Modified Electrode

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Nitrogen doped reduced graphene oxide (N-RGO) was prepared by a facile one-step procedure with ammonium hydroxide as the doping regent and hydrazine hydrate as the reducing regent. The obtained N-RGO was characterized by transmission electron microscope (TEM), Fourier transform infrared spectra (FTIR) and X-ray photoelectron spectroscopy(XPS). The characterized results validated the successful nitrogen doping of 1.8 at% and the reducing of graphene oxide to RGO. N-RGO modified glassy carbon electrode (N-RGO/GC) was explored for the simultaneous determination of hydroquinone (HQ) and catechol (CC) using cyclic voltammetry (CV) and differential pulse voltammetry (DPV). The potential separation of the oxidation peaks between HQ and CC were up to 110 mV, which is enough to electrochemical distinguish the dihycroxybenzene isomers. Under the optimal conditions, the oxidation peak currents of HQ and CC linearly increased with the concentrations in the ranges from 5 to 693 and 5 to 492 μmol/L, respectively. The detection limits are 0.1 μmol/L for HQ and 0.5 μmol/L for CC. When simultaneously changing the concentration of the two isomers, the linear range was from 15 to 330 μmol/L for both HQ and CC. The relative standard deviations (n=20) are 3.45% for HQ and 3.82 % for CC.

Keywords: Nitrogen doping; graphene; simultaneous determination; hydroquinone; catechol

FULL TEXT