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Nile Blue-hexacyanoferrate carbon paste modified electrode as an amperometric sensor for determination of hydrazine

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Abstract: The main problem associated with metal hexacyanoferrates (MHCFs) is their instability at high pH values. We synthesized a new Prussian Blue analogue, Nile-Blue hexacyanoferrate (NBHCF), that remains stable in 0.2 M KOH. A carbon paste (CPE) chemically modified electrode (ME) containing NBHCF was prepared as a stable electrochemical sensor for measuring hydrazine. A detailed characterization of the electrochemical and electrocatalytic behavior of NBHCF was performed using cyclic voltammetric, chronoamperometric, differential pulse voltammetric (DPV) and hydrodynamic amperometric methods. The NBHCF-modified electrode produced reproducible redox peaks and resulted in a linear increase in the oxidation signal of hydrazine with increasing concentration of hydrazine in the range of 0.1-6.0 mM (in hydrodynamic amperometry method (HDA)). The electrode detection limit was 40 μ M and possessed a surface coverage of Γ = 2.0 \times 10^{-8} mol cm^{-2}.

Key Words: Modified electrode, carbon paste electrode, hexacyanoferrate, amperometric determination of hydrazine, Nile-Blue hexacyanoferrate

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