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Synthesis and characterization of carbon nanotubes/asymmetric novel tetradentate ligand forming complexes on PIGE modified electrode for simultaneous determination of Pb(II) and Hg(II) in sea water, Lake water and well water using anodic stripping voltammetry

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Abstract

The graphite electrodes coated with a CNT/asymmetrical N₄ tetradentate Schiff base ligand N,N'-bis(pyrrole-2-ylmethylene)-2-aminobenzylamine has been synthesized by condensation of 2-aminobenzylamine and pyrrole-2-carboxaldehyde was investigated as an electrochemical sensor in the simultaneous determination of Pb(II) and Hg(II) in 0.1 M acetate buffer at pH 4.5. The morphology of electrodes surface has been characterized by scanning electron microscopy and electrochemical impedance spectroscopy. The electrochemical response characteristics of the modified electrode towards the Pb(II) and Hg(II) were investigated by SWASV. Detailed experiments were conducted to establish the optimal parameters of deposition and stripping of metal ions, such as supporting electrolytes, pH, deposition time. Linear calibration graph ranging from 3.3 - 66 nM Pb(II) and Hg(II) metal ions. The LOD were 1.1 nM for Pb(II) and 0.36 nM for Hg(II) (S/N=3). The novel sensor was successfully applied to determine Pb(II) and Hg(II) in real samples with good recovery.

Keywords: Asymmetric Schiff base ligand, Hg(II) and Pb(II), square wave anodic stripping voltammetry, chemically modified electrode.

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