VOLTAMMETRIC DETERMINATION OF MERCURY AT A FULLER'S EARTH MODIFIED CARBON PASTE ELECTRODE

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Metals are found in soils as natural ingredients. However, in the last quarter of a century, considerable changes in the worldwide resources of heavy metals at the earth's surface have occurred. The presence of even low concentrations of heavy metals in the soils are known to have potential impact on environmental quality and human health via ground water, surface water, plants and agricultural products. The desire of electrochemists to reach the perfect electrode surface of required properties and of excellent quality together with their effort to understand and to control adsorption processes on the electrode surfaces have led to developing of chemically modified electrodes (ChemMEs) [1-8].

The objective of the present work was to develop a sensitive and selective analytical method for determination of trace amounts of mercury by using differential pulse anodic stripping voltammetry (DPASV) at fuller’s earth modified carbon paste electrode (FEMCPE). (FEMCPE) was developed for the voltammetric determination of trace amounts of Hg(II). Many parameters such as the composition of the paste, preconcentration time, potential and stirring rate influence the response of the measurement. The procedure was optimized for mercury determination. The FEMCPE electrode was prepared by mixing 0.03 g clay, 0.15 g graphite powder and 30 μL paraffin oil in a mortar; then mixture was homogenized. The modified carbon paste was pressed into the cavity of the electrode body and the electrical contact was established with a Pt wire. The electrode surface was smoothed and polished on a weighing paper. 0.05 M (pH 4.75) NaAc-HAc buffer solution was used as supporting electrolyte for Hg(II) determination. The effect of accumulation step was evaluated at -0.1 V deposition potential, 5 and 10 min. deposition time while stirring the solution at 800 rpm. After an appropriate preconcentration step, the electrode was rinsed with deionized water. Reduced mercury was stripped from the electrode surface during the potential sweep of 0 V to 0.5V, and a well-defined stripping peaks were obtained mean potential value of 0.29 V depending on metal concentrations. For mercury detection in Fuller’s earth, a linear response of the carbon paste electrode was observed in the 8x10⁻⁷-2x10⁻⁵ M range with good reproducibility. At the present work the interference between mercury and metal ions of Cu(II) and Pb(II) during voltammetric determination of Hg(II) was also investigated.

References