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ANODIC DETERMINATION OF PENTACHLOROPHENOL FROM WATER USING CARBON NANOFIBER-BASED COMPOSITE ELECTRODE

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Abstract

The assessment of a carbon nanofiber-expanded graphite-epoxy composite (CNF-EG-Epoxy) electrode for the anodic determination of PCP (pentachlorophenol) is described. Cyclic voltammetry technique was used to characterize the electrochemical behaviour of PCP at CNF-EG-Epoxy electrode in 0.1 M Na_2SO_4 supporting electrolytes in order to establish the parameters for amperometric/voltammetric determination of PCP. The linear dependence of the current versus PCP concentration was reached in the concentration range between 0.75 to 15 μM PCP using cyclic voltammetry (CV), differential-pulsed voltammetry (DPV), chronoamperometry (CA), and multiple-pulsed amperometry (MPA). Under the conditions of CA application, the fouling effect of the electrode occurred, which was avoided by MPA application that assures in-situ electrochemical cleaning of the electrode. The best electroanalytical parameters of the sensitivity, the relative standard deviation, the lowest limit of detection and the limit of quantification were obtained by MPA application, revealing that CNF-EG-Epoxy electrode exhibited useful characteristics for electrochemical determination of PCP from aqueous solution. In addition, some mechanistic aspects regarding PCP oxidation on CNF-EG-Epoxy electrode were discussed by performing CV at different scan rates.

Key words: anodic determination, carbon nanofiber-expanded graphite-epoxy composite electrode, electrochemical determination, pentachlorophenol

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