Copper(II) Trace Determination in Aqueous/Ethanollic Medium Using an Ionic Imprinted Hybrid

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In this work, an ionic imprinted hybrid material organically modified with 3-(2-imidazolin-1-yl)propyltriethoxysilane with copper(II) as template was prepared and structurally characterized, using elemental analysis, X-ray powder diffraction (XRD), thermogravimetric analysis, infrared spectroscopy and solid state ¹³C and ²⁹Si nuclear magnetic resonance (NMR). Experiments with cyclic voltammetry and differential pulse anodic stripping voltammetry (DPASV) showed that the electrode prepared was stable over 100 cycles, with high reproducibility. Copper(II) ions could be quantified in water/Brazilian sugar cane spirit (cachaça). Calibration curve for detection was obtained from 5.98 – 201.42 µg L⁻¹ of copper(II) concentration, with a correlation coefficient of $R^2 = 0.995$; $n = 12$. The detection limit obtained was (LOD) as 0.74 µg L⁻¹ and the limit of quantification (LOQ) was of 2.48 µg L⁻¹ in water/cachaça. The interference studies in presence of Na(I), Fe(II), Pb(II), Ni(II), and Zn(II) do not significantly affected the peak currents, with high recovery of copper(II) in the range 91.20 % to 109.11 % in ethanollic medium and 89.54 % to 116.78% in aqueous medium. The DPASV technique was used to determine copper(II) in commercial samples in aqueous/ethanollic medium such as tap water, cachaça and ethanol fuel and the results were compared with the values found by flame atomic absorption spectrometry (FAAS).

Keywords: hybrid material; imidazole; copper(II); tap water; cachaça; ethanol fuel

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