Metal-organic Framework-Modified Carbon Paste Electrode for Determining Lead in Aqueous Solutions

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In this work, a novel carbon paste electrode was modified with metal-organic framework (MOF) 235 for detecting lead ions in aqueous solutions using anodic redissolution voltammetry as analytical technique. Experimental parameters such as, amount of MOF-235, type of supporting electrolyte, potential and time deposition were evaluated to optimize the detection approach. The Pb²⁺ detection response of this MOF-modified electrode allowed to achieve a detection limit of about 18 µg L⁻¹ with a correlation coefficient (R²) of about 0.9962, extending in a linear concentration range from 50 to 300 µg L⁻¹. Drinking water samples (as-received or spiked with well-known lead concentration) were analyzed to determine the concentration of lead ions. Data were also confirmed by Atomic Absorption Spectroscopy (AAS). Furthermore, the electrochemical determination when compared with the AAS, has shown that the electroanalytical approach represents a fast and quite reliable alternative for monitoring heavy metals.

Keywords: “MOF – 235”; “carbon paste electrode”; “lead”; “modified electrode”

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