Short Communication

Validation of the Polyacrylic acid/Glassy Carbon Differential Pulse Anodic Stripping Voltammetric Sensor for Simultaneous Analysis of Lead(II), Cadmium(II) and Cobalt(II) Ions

Moses O. Oyagi, John O. Onyatta, Geoffrey N. Kamau, Peterson M. Guto*

Department of Chemistry, University of Nairobi, P. O. Box 30197, Nairobi, Kenya

*E-mail: Peterson.guto@uonbi.ac.ke

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Electrochemical sensor validation ensures that the determination procedure employed for a specific test is suitable for its intended use. Accuracy and precision, linearity, range, limits of detection and quantification validation parameters were determined for the Polyacrylic acid/Glassy Carbon Differential Pulse Anodic Stripping Voltammetric Sensor used for the simultaneous analysis of Pb(II), Cd(II) and Co(II) in accordance with the guidelines of the ISO/IEC 17025. The recovery degree for accuracy were in the range of 101% to 110% for Pb(II), 100% to 105% for Cd(II) and 93% to 104% for Co(II). The precision was found to be less than 10% for ten determinations. Linear concentration range were also investigated and found to lie in the range of 125 – 7.8µM Pb(II), 16 – 2µM Cd(II) and 2 – 0.125mM Co(II). Limits of detection also were found to be 0.9nM Pb, 1.9mM Cd and 11.0µM Co and limits of quantitation were 3.0nM Pb, 6.3nM Cd and 36.7µM Co. The effects of foreign substances like Cu²⁺, SO₄²⁻, K⁺, Na⁺, Cl⁻, NH₄⁺ and O₂ were found to have no significant effect on the electrochemical responses of the three heavy metals. These results confirms that this sensor can provide accurate, reliable and consistent results for the determination of Pb(II), Cd(II) and Co(II) heavy metals in diverse samples.

Keywords: Validation, Polyacrylic acid/Glassy carbon electrode, Lead, Cadmium, Cobalt and differential pulse anodic stripping voltammetry.

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