Adsorptive Stripping Voltammetric Determination of Lead and Cadmium in Natural Waters in the Presence of Rutin Using a Nafion–Mercury Coated Film Electrode

Verónica Arancibia^{1,*}, Edgar Nagles^{2,*}, Olimpo García-Beltrán², John Hurtado³

¹ Pontificia Universidad Católica de Chile, Facultad de Química, Vicuña Mackenna 4860, Santiago 7820436, Chile.

² Universidad de Ibagué, Facultad de Ciencias Naturales y Matemáticas, Carrera 22, Calle 67, Ibagué 730001, Colombia.

³ Universidad de los Andes, Departamento de Química, Carrera 1 N°. 18A-12, Bogotá, Colombia.

*E-mail: edgar.nagles@unibague.edu.co, darancim@uc.cl

doi: 10.20964/2018.09.19

Received: 9 April 2018 / Accepted: 26 May 2018 / Published: 5 August 2018

A sensitive method for the simultaneous determination of Pb(II) and Cd(II) based on the formation of their complexes with rutin (RUT) and subsequent adsorptive deposition on a Nafion–mercury coated glassy carbon electrode (GC–NHgFE) is presented. The effects of various operational parameters such as pH, ligand concentration, accumulation potential, and time were optimized. The best experimental conditions found were: pH 3.5; C_{RUT} : 0.10 mmol L⁻¹; t_{ads} : 100 s, and E_{ads} : 0.15 V. Under these conditions, the reductions signals of Pb–RUT and Cd–RUT complexes are found at –0.29 V and –0.46 V, respectively, while no signal of free RUT was seen. The relationship between peak current and Pb(II), Cd(II) concentrations are linear in the 1.0–62.0 µg L⁻¹ range. The detection limits (DLs) were found to be 0.16 and 0.06 µg L⁻¹ for Pb(II) and Cd(II), respectively. Finally, the method was applied to the determination of Pb(II) and Cd(II) in water from the Ambala river (Colombia) and in commercial mineral water with satisfactory results.

Keywords: Rutin; Lead and Cadmium; Adsorptive Stripping Voltammetry; Nafion–mercury coated glassy carbon electrode.

[FULL TEXT](#)

© 2018 The Authors. Published by ESG (www.electrochemsci.org). This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution license (<http://creativecommons.org/licenses/by/4.0/>).