Bentonite Modified Carbon Paste Electrode as a Selective Electrochemical Sensor for the Detection of Cadmium and Lead in Aqueous Solution

Ali Ourari^{1,*}, Farid Tennah^{1,2}, Ramiro Ruíz-Rosas², Djouhra Aggoun^{1,*}, Emilia Morallón²

¹ Laboratoire d'Electrochimie, d'Ingénierie Moléculaire et de Catalyse Redox (LEIMCR), Faculté de Technologie, Université Setif-1, Setif 19000, Algeria.

² Instituto Universitario de Materiales, Universidad de Alicante, Ap. 99. E-03080 Alicante, Spain.

*E-mail: alourari@yahoo.fr (A. Ourari); aggoun81@yahoo.fr (Dj. Aggoun)

doi: 10.20964/2018.02.35

Received: 25 October 2017 / Accepted: 12 December 2017 / Published: 28 December 2017

This work describes the use of a carbon paste electrode (CPE) modified with a Bentonite clay (Maghnite) as an electrochemical non-pollutant, selective and low cost sensor for Cadmium and Lead detection in aqueous solution. The physico-chemical properties of the clay mineral were analysed by X-Ray Fluorescence analysis (XRF), Powder X-ray diffraction (XRD), Thermogravimetric analysis (TG) and N₂ adsorption isotherm. The square wave anodic stripping voltammetry (SWASV) has been used in which the different electrochemical parameters have been studied. The optimal preconcentration pH and Maghnite-CPE content were found to be 3.4 and 14% w/w respectively. Under these optimized conditions and at a preconcentration time of 5 min, the response of the electrode was linear with analytes concentration in the ranges from 1 to 30 µmol/L for Cadmium and 0.1 to 30 µmol/L for Lead with limit of detection (LOD) values of 0.16 µmol/L and 0.30 µmol/L for Cadmium and Lead respectively.

Keywords: Bentonite (Maghnite), Carbon paste electrode (CPE), Anodic stripping voltammetry (ASV), Square wave voltammetry (SWV), Electrochemical sensor, Cadmium and Lead.

[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/>).