

Electrochemical behavior of carbon paste electrode modified with ternary natural deep eutectic solvent for determination of carbendazim in tap water.

Suysia R. D'Almeida (PG),¹ Rafael M. Buoro (PQ)^{1*}.

suysiadalmeida@usp.br; rafbuoro@iqsc.usp.br

¹Departamento de Química e Física Molecular, Instituto de Química de São Carlos, Universidade de São Paulo

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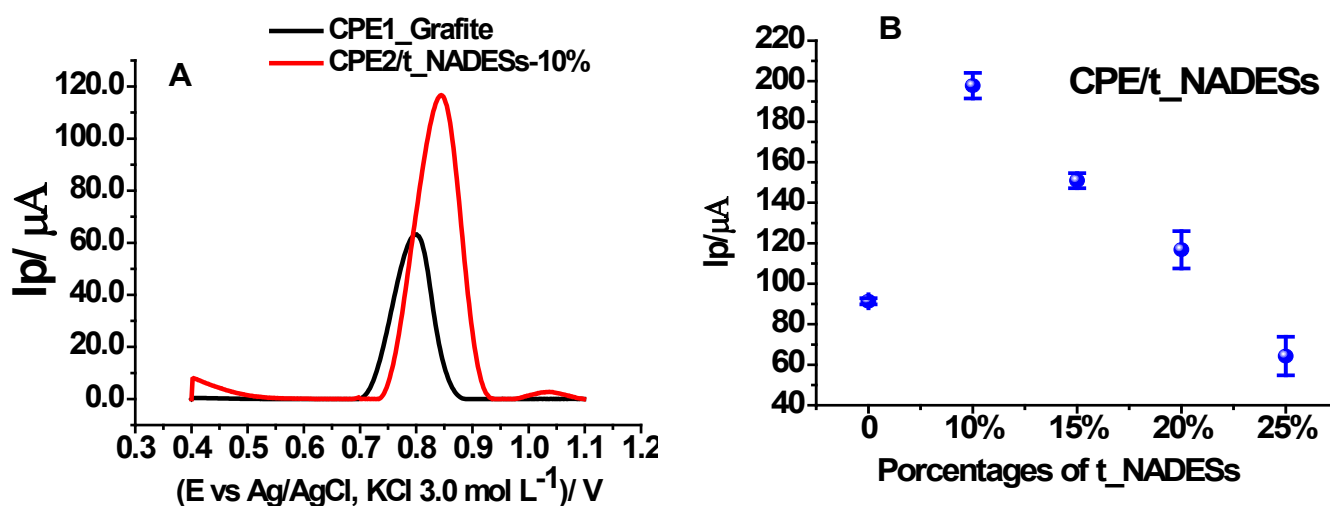
Highlights

The t_NADES modified CPE presented superior performance when compared to CPE. CPE2/t_NADES-10% compared as binder modifying agents. The CPE/t_NADES presented superior performance for oxidation of CRZ.

Resumo/Abstract

Carbon paste electrodes (CPE) have been used for the electrochemical determination of toxic contaminants due of many advantages such as easiness surface renewal, low manufacturing cost, and possibility of direct modification of the composite [1]. Natural Deep Eutectic Solvent (NADESs) can be defined as a mixture of two or more natural organic compounds when at a particular molar ratio, having a melting point significantly lower than that of either individual component [2]. In this work, a new ternary NADESs based on sugars was proposed for the modification of carbon paste electrodes. The t_NADES was synthesized adapting the method proposed by Abbott [3]. D (+) glucose (HBA), L (+) tartaric acid and glycerol (HBD) were mixed simultaneously in a 1:1:5 (mHBA/mHBD) ratio under vigorous stirring and controlled temperature (80 °C). A homogeneous liquid was obtained and then allowed to be cooled to room temperature. The carbon paste composite was prepared by substituting a fraction (10-25%) of the binder (mineral oil) by the eutectic mixture. The electroanalytical performance of the electrodes was evaluated and characterized using cyclic and square wave voltammetry. The modified carbon paste electrodes (CPE/t_NADES-10%) were evaluated towards their efficiency for determination carbendazim (CRZ) by electrochemical techniques. The CPE/t_NADES-10% showed the best peak current performance compared to CPE (Fig. 1A and B). For percentages higher than 10%, the decrease in the peak current is associated to the loss of cohesion of the carbon paste due the increase of the water affinity by the composite.

Fig. 1: (A) square wave voltammograms for 500 $\mu\text{mol L}^{-1}$ carbendazim in phosphate buffer (pH 7.0) for CPE and CPE_NADESs.



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