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Potentiality of PARAFAC approaches for simultaneous determination of N-acetylcysteine and acetaminophen based on the second-order data obtained from differential pulse voltammetry

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PII: S0039-9140(18)30905-6
DOI: https://doi.org/10.1016/j.talanta.2018.08.092
Reference: TAL19013

To appear in: *Talanta*

Received date: 13 April 2018
Revised date: 27 August 2018
Accepted date: 31 August 2018

Cite this article as: Khalil Zarnousheh Farahani, Ali Benvidi, Masoud Rezaeinasab, Saleheh Abbasi, Mohammad Abdollahi-Alibeik, Ali Rezaeipoor-Anari, Mohammad Ali Karimi Zarchi and Seyed Shahab Addin Darbandizadeh Mohammad Abadi, Potentiality of PARAFAC approaches for simultaneous determination of N-acetylcysteine and acetaminophen based on the second-order data obtained from differential pulse voltammetry, *Talanta,* https://doi.org/10.1016/j.talanta.2018.08.092

Simultaneous determination of N-acetylcysteine and acetaminophen at carbon paste electrode modified with silica nano particles and 4,4′- Dihydroxybiphenyl (DHB): Potentiality of PARAFAC approaches for analysis of second-order data obtained from differential pulse voltammetry

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ABSTRACT

N-acetylcysteine (N-AC) has widespread application such as pharmaceutical drug and nutritional supplement. Its adverse effects are rash, urticaria, and itchiness and large doses of N-AC could potentially cause damage to the heart and lungs. Therefore, in this work, a sensitive voltammetric sensor based on a carbon paste electrode modified with silica nano particles (i.e. Mobil Composition of Matter (No. 41) modified with Boron Trifluoride or BF_3@MCM-41) with a combination of 4, 4′-dihydroxybiphenyl (DHB) (BF_3@MCM-41/DHB/CPE) was designed for determination of N-AC. The electrochemical oxidation of N-AC was examined using various techniques such as cyclic voltammetry (CV), chronoamperometry and differential pulse voltammetry (DPV). Under the optimum conditions, some parameters such as electron transfer coefficient (α) and heterogeneous rate constant (k_s) were estimated for N-AC. Due to the use of N-AC for the treatment of acetaminophen (AC) overdose, the application of modified electrode was investigated for the simultaneous determination of N-AC and AC in blood serum and tablet samples. Since, the signals of these species overlap and due to the presence of interfering species in blood samples, the simultaneous