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Electrochemical detection of 25C-NBOH in seized blotter paper samples

Layla Amanda Acácio de Souza[1*], William Reis de Araujo[1]
[1]Universidade Estadual de Campinas, CEP: 13083-872, Campinas, São Paulo, Brazil
** e-mail:layla.souzacacio@gmail.com*

ABSTRACT

The present study describes a disposable carbon-based sensor for the electrochemical characterization and detection of 25C-NBOH by applying Cyclic Voltammetry (CV) and Differential Pulse Voltammetry (DPV) techniques. The optimized method presented a limit of detection of 2.68 µmol L^{-1} and was applied for the quantification of 25C-NBOH in seized blotter paper samples and achieved a 423 ± 59 µg per blotter paper (n=3). The selectivity study confirmed the adequate ability to rapid screening this drug compared to other relevant seized drugs, including NBOMes.

Keywords: NBOHs, Electrochemical, NPS.

Introduction

The 25X-NBOHs, classified as New Psychoactive Substances, are thermolabile and their accurate determination can be a challenge using the gas chromatography technique, which can require additional steps in their analysis[1]. In this context, electrochemical sensors present some advantages such as portability, low cost, adequate selectivity, small sample volumes and can be miniaturized[2].

Objectives

Development of an electrochemical sensor for the rapid detection of 25C-NBOH.

Methods

The stencil-printed electrochemical sensors were fabricated using conductive carbon and Ag/AgCl inks (Creative Materials®) on a phenolite substrate. The seized blotter paper samples were immersed in chloroform, followed by extraction in methanol. The CV technique was applied to study the influence of pH (2.0 – 12.0) and mass transport (varying the scan rate from 10 to 300 mV s^{-1}) involved in the oxidation processes of 25C-NBOH in a potential range of 0.0 to 1.4 V. For quantification purposes, an analytical curve was built using the DPV in the concentration range of 5.0 to 100.0 µmol L^{-1}. The selectivity of the sensor was evaluated by testing the response of 25B-NBOMe, 25B-NBOH, DOB, and LSD.

Results and Discussion

The pH study revealed that 25C-NBOH presented up to 3 irreversible and pH-dependent oxidation processes. The mass transport study revealed that all redox processes are mostly controlled by diffusion. The calibration curve presented two linear intervals (5.0-35.0 µmol L^{-1} and 35.0-100.0 µmol L^{-1}). The limit of detection (LOD) and quantification (LOQ) were calculated as 2.68 µmol L^{-1} and 8.92 µmol L^{-1}, respectively. Using the optimal conditions, the method was applied to the detection of 25C-NBOH in seized blotter papers obtained from SETEC/PF/MG. Using the standard addition method, it was determined 423 ± 59 µg of 25C-NBOH per blotter paper. The method presented adequate selectivity to detect 25C-NBOH when using the first oxidation process close to 0.37 V.

Conclusion

A low-cost and disposable electrochemical sensor for 25C-NBOH detection with adequate sensitivity and selectivity was developed, which allows both laboratory and field analysis.

References

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