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ORGANIZAÇÃO:



## Modified Carbon Paste Electrode for Theobromine Detection

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This work [1] presented consists of the construction and application of an electrochemical sensor using a carbon paste electrode (CPE) chemically modified with a Schiff base complex [V<sup>III</sup>O(salen)] for the determination and quantification of theobromine in chocolate powder samples. The main objective is to provide a simple, economical, and environmentally sustainable method for agile and efficient analysis in the food and pharmaceutical industries.

An AFM evaluation of the modified working electrode revealed notable surface modifications, including increased thickness and roughness that encourage analyte contact. The amperometric sensitivity for CV was 2.91 ( $\pm 0.10$ )  $\mu\text{mol L}^{-1}/\mu\text{A}$  for the anodic peak and 18.66 ( $\pm 0.44$ )  $\mu\text{mol L}^{-1}/\mu\text{A}$  for the cathodic peak on the CPE@[V<sup>III</sup>O(salen)] electrode, with LODs of 0.22 ( $\pm 0.01$ )  $\mu\text{mol L}^{-1}$  and 0.38 ( $\pm 0.01$ )  $\mu\text{mol L}^{-1}$ , respectively. For SWV, the amperometric sensitivity values were equal to 5.38 ( $\pm 0.17$ )  $\mu\text{A}/\mu\text{mol L}^{-1}$  and 2.60 ( $\pm 0.05$ )  $\mu\text{mol L}^{-1}/\mu\text{A}$ , with LODs of 0.40 ( $\pm 0.01$ )  $\mu\text{mol L}^{-1}$  and 0.41 ( $\pm 0.01$ )  $\mu\text{mol L}^{-1}$  for the anodic and cathodic peaks, respectively.

An analysis of the chocolate powder samples by HPLC-DAD confirmed the presence of theobromine, with a sensitivity comparable to electrochemical analysis, whose linear range of quantification of the analyte varied from 4.93 ( $\pm 0.02$ )  $\mu\text{mol L}^{-1}$  to 14.94 ( $\pm 0.02$ )  $\mu\text{mol L}^{-1}$ . The research presented highlights the efficacy of CPE modified with [V<sup>III</sup>O(salen)] for the sensitive and selective electrochemical determination of theobromine. The electrode offers significant advantages over traditional methods of analysis, including a shorter analysis time, a lower relative cost, and environmental sustainability. Ultimately, its successful application in chocolate powder samples demonstrates its suitability for industrial quality control.

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### **Reference:**

[1] Larissa Silva de Azevedo, Alex Soares Castro, Alex Almeida Chedid and Marcelo Firmino de Oliveira, Current Topics in Analytical Chemistry, vol. 15, pp. 53-68 (2023)