A Simple and Sensitive Electrochemical Sensor Based on Azodicarbonamide for the Determination of Tert-Butylhydroquinone in Food

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An electrochemical sensor for the determination of the antioxidant tert-butyl hydroquinone (TBHQ) in food was prepared by using a modified electrode based on azodicarbonamide (ADC) on a glassy carbon electrode (GCE) surface. The electrochemical behavior of TBHQ on the modified electrode was studied by cyclic voltammetry (CV) and differential pulse voltammetry (DPV). The results showed that the peak redox current was significantly stronger than that on the bare GCE and that the detection sensitivity was improved. The experimental conditions, including the electrochemical polymerization pH value of the ADC solution, scanning rate, voltage, sweep segments and pH value of the TBHQ solution were optimized. Under optimal conditions, TBHQ presented a linear relationship with the oxidation peak current within the concentration range of $4.00 \times 10^{-7} \sim 4.00 \times 10^{-4}$ mol/L; the correlation coefficient was $R=0.9988$, and the limit of detection was 1.80×10^{-9} mol/L. The modified electrode was applied for the determination of real food samples containing TBHQ, with recovery ranging between 96.5 and 103.0%. This electrochemical method showed good selectivity and high sensitivity.

Keywords: azodicarbonamide; glassy carbon electrode; tert-butyl hydroquinone

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