Electrochemical Determination of Diuron in Soil Using a Nanocrystalline Cellulose Modified Carbon Paste Electrode

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doi: 10.20964/2021.05.31

Received: 9 April 2020 / Accepted: 31 August 2020 / Published: 31 March 2021

An electrochemical sensor based on nanocrystalline cellulose (NC) modified carbon paste electrode (CPE) was developed for the electrochemical detection of diuron in soil samples. Energy dispersive X-ray spectroscopy (EDX) and Scanning electron microscopy (SEM) were used for the elemental and morphological characterization of elaborated CPEs, respectively. Electrochemical studies of diuron using the elaborated CPE were performed by cyclic voltammetry (CV) and square wave voltammetry (SWV). The NC-CPE showed an enhanced electrochemical response, with sensitivity 2.3-fold higher than the signal obtained at the unmodified CPE. Key analytical parameters such as pH, scan rate, and the amount of NC in the carbon paste were investigated and optimized. Excellent results were obtained with a linear range from 4.2 to 47 $\mu\text{mol/L}$ with a detection limit (LOD) of 0.35 μM (S/B = 3). An application of the proposed method to enriched soil samples resulted in a recovery of 96%, showing good stability, reproducibility and reliability of tested sensors.

Keywords: Diuron, carbon paste electrode, cellulose, voltammetry, detection.

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