

Application of multi-wall carbon nanotubes to enhance the electrochemical response of biomimetic sensors for determination of pesticides in different samples

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Pesticides are natural or synthetic substances used to control or repel pests. Because of the increasing application of pesticides, there is a need for their environmental and biological monitoring to assess the environmental pollution, occupational exposures, and public exposure due to domestic and urban usage of these compounds. Sensors, as the miniaturized instruments, are the appropriate and interested devices to monitor the trace pesticides. The aim of this study was investigation the effect of applying multi-walls carbon nanotubes (MWCNTs) and molecularly imprinted polymers (MIPs) to modify the composition of carbon paste electrode.

The MIPs were synthesized for diazinon and dicloran pesticides and then, they were used in the carbon paste composition in combination with MWCNTs. After optimization of electrode composition, it was used to determine the concentration of analyte. Instrumental parameters affecting the square wave voltammetric response were adjusted to obtain the highest current intensity.

The modified electrode showed very high recognition ability compared to bare carbon paste electrode. The detection limits of the sensors were 1.3×10^{-10} and 4.8×10^{-10} mol L⁻¹ for diazinon and dicloran, respectively. These sensors were used to determine diazinon and dicloran in real samples (human urine, tap, and river water samples) without special sample pre-treatment before analysis.

The MWCNTs enhance the sensor responses due to increasing of the electrode surface area, as well as improving the electron transfer between the electrode and the supporting electrolyte. The presence of MIPs can greatly increase the selectivity of the electrode. The optimization of electrode composition improved its response considerably.

Biography:

Monireh Khadem was born on August 14, 1980. She done PhD in occupational health engineering and work in Tehran University of Medical Sciences as an academic member. She was interested in sample preparation, the environmental and biological monitoring of chemicals, and improving the analytical methods for evaluation of the worker exposure. For this purpose, She cooperate with chemists in University of Tehran to conduct the common studies.