

Cholinesterase sensors based on screen-printed electrodes for detection of organophosphorus and carbamic pesticides

Ivanov A., Evtugyn G., Budnikov H., Ricci F., Moscone D., Palleschi G.
Kazan Federal University, 420008, Kremlevskaya 18, Kazan, Russia

Abstract

Cholinesterase sensors based on screen-printed electrodes modified with polyaniline, 7,7',8,8'-tetracyanoquinodimethane (TCNQ), and Prussian blue have been developed and tested for detection of anticholinesterase pesticides in aqueous solution and in spiked grape juice. The influence of enzyme source and detection mode on biosensor performance was explored. It was shown that modification of the electrodes results in significant improvement of their analytical characteristics for pesticide determination. Thus, the slopes of the calibration curves obtained with modified electrodes were increased twofold and the detection limits of the pesticides were reduced by factors of 1.6 to 1.8 in comparison with the use of unmodified transducers. The biosensors developed make it possible to detect down to 2×10^{-8} mol L⁻¹ chlorpyrifos-methyl, 5×10^{-8} mol L⁻¹ coumaphos, and 8×10^{-9} mol L⁻¹ carbofuran in aqueous solution and grape juice. The optimal conditions for grape juice pretreatment were determined to diminish interference from the sample matrix. © Springer-Verlag 2003.

<http://dx.doi.org/10.1007/s00216-003-2174-9>

Keywords

Biosensor, Cholinesterase sensor, Grapes testing, Pesticide detection