

研究论文

可检测有机磷农药残留的丝网印刷酶电极

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**摘要** 制备了用于有机磷农药检测的电化学生物酶电极, 并从工作电极上修饰物的选择、测定电压的确定、生物酶电极预活化时间的选定、测定时间的选定、温度的影响、pH值的影响、底物浓度的影响、固定方法的选择、固定酶时温度和时间的影响等多方面对丝网印刷的生物酶电极进行了较为全面的研究, 应用经过优化的生物酶电极对有机磷农药乙基对氧磷进行了检测. 结果表明:

抑制率与乙基对氧磷浓度的常用对数在 $1.00 \times 10^{-7} \sim 1.00 \times 10^{-5} \text{ g} \cdot \text{mL}^{-1}$ 范围内成线性关系, 线性回归方程为 $A/\% = 267.2 + 37.20 \lg [c/(\text{g} \cdot \text{mL}^{-1})]$ , 相关系数 $r = 0.9882$ . 当信噪比为3时, 检出限为 $2.10 \text{ ng} \cdot \text{mL}^{-1}$ , 低于国家标准所要求的最低残留量.

**关键词** [酶电极](#) [丝网印刷](#) [农药残留](#) [电化学](#) [乙酰胆碱酯酶](#)

分类号

## Screen-printed Enzyme Electrodes for Detection of Organophosphate Pesticide Residue

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**Abstract** A sensitive amperometric screen-printed enzyme electrode suitable for detection of organophosphate pesticide residue was developed, which can be operated at a low applied potential of 0.10 V. The first part of the study was focused on selected condition such as accession of the modified material and applied potential on electrode, optimization of the pretreatment time and response time, influence of environment temperature and pH of phosphate buffer solution, effect of substrate concentration, choice of immobilization method, effect of temperature and time when enzyme was immobilized on screen-printed electrodes. In the second part of the study, pesticide paraoxon-ethyl and reality sample were detected. The lowest detectable concentration in a standard solution was  $2.10 \text{ ng} \cdot \text{mL}^{-1}$ . The immobilization procedure can be easily adapted to the working electrode employed by electrochemical detectors. This novel method of screen-printed enzyme electrode is promising for the development of subminiature apparatus for measuring pesticide residues.

**Key words** [enzyme electrode](#) [screen-printed](#) [organophosphate pesticide residue](#) [electrochemistry](#) [acetylcholinesterase](#)

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