

Enzymatic Conductometric Biosensor Based on PVC Membrane Containing Methyl Viologen/Nafion[®]/Nitrate Reductase for Determination of Nitrate in Natural Water Samples

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A highly sensitive, fast, and stable conductometric enzyme biosensor for the determination of nitrate in water is described and validated in natural water samples. The nitrate biosensor is based on a methyl viologen mediator mixed with nitrate reductase (NR) from *Aspergillus niger* and Nafion[®] cation-exchange polymer dissolved in a plasticized PVC membrane deposited on the sensitive surface of interdigitated electrodes. The process parameters for the fabrication of the enzyme biosensor and various measuring conditions such as pH buffer concentration and temperature were investigated with regard to their effect on sensitivity, limit of detection, dynamic range and operational and storage stabilities. The sensitivity of the nitrate sensor was approximately 1.48 $\mu\text{S}\cdot\text{L}/\text{mg}$, the detection limit was 1.2 $\mu\text{g}/\text{L}$, and linear calibration was in the range from 4×10^{-3} to 8 mg/L with an application domain from 4×10^{-3} to 50 mg/L. When stored in 20 mM phosphate buffer (pH 7.5) at 4°C, the sensor showed good stability over 2 months.

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