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OPTIMIZATION OF ISEs FOR SIMULTANEOUS NH_4^+, NO_3^- AND NO_2^- MONITORING IN SYNTHETIC WASTEWATER USING *SOLVER*

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Abstract

The adaptation of commercially available ion-selective electrodes (ISEs) for use in wastewater matrices was demonstrated using multivariate analysis and optimization with the Microsoft Excel *Solver* tool. The electrodes were characterized in pure analyte solutions, and their parameters were estimated using multivariate analysis and *Solver* optimization. The ammonium, nitrate, and nitrite ions were measured in model systems that were designed to simulate wastewater. The accuracy of the measurements (95.3% - 101.0%) was satisfactory for the determination of ammonium, nitrate, and nitrite in complex matrices. The adapted ISEs were then successfully used for bioprocess (synthetic wastewater treatment) dynamics and efficiency studies in a horizontal rotating tubular bioreactor (HRTB) by monitoring the concentrations of the substrates and intermediates in the samples collected from the bioreactor. The simultaneous determination of ammonium, nitrate, and nitrite in the samples through the use of adapted ISEs considerably shortened the time required for ion determination.

Key words: ammonium, ion-selective electrodes, nitrate, nitrite, wastewater

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