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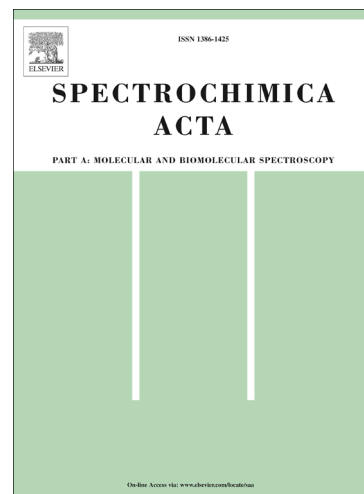
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An on-line spectrophotometric determination of trace amounts of thiourea in tap water, orange juice, and orange peel samples using multi-channel flow injection analysis

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Abstract

In this work, a flow injection analysis (FIA) method was introduced for the determination of trace amounts of thiourea in tap water. This method is based upon the inhibition effect of thiourea on the reaction between meta-cresol purple (MCP) and potassium bromate catalyzed by bromide ions in a sulfuric acid medium. In the presence of thiourea, an induction period appears in the reaction system, and as a result, the absorbance of MCP increases at 525 nm in the FIA manifold. The chemical and FIA variables are studied and optimized using the univariate and Simplex optimization methods. Under the optimum conditions, thiourea can be determined in the range of 0.100-13.0 $\mu\text{g mL}^{-1}$. The limit of detection (3σ) for thiourea was found to be 0.0310 $\mu\text{g mL}^{-1}$. The relative standard deviations (RSDs) for six replicate determinations of 0.500, 5.00, and 12.0 $\mu\text{g mL}^{-1}$ of thiourea were 4.0, 1.8, and 1.2%, respectively. The proposed method was also applied for the determination of thiourea in orange juice and orange peel samples with recoveries in the range of 98.0–101%. The analytical speed of the method was calculated to be about 120 sample per hour.

Keywords: Thiourea; Induction period; Flow injection analysis (FIA); Meta-cresol purple (MCP); Simplex optimization; Spectrophotometry.

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