

SEQUENTIAL INJECTION SYSTEM FOR POTENTIOMETRIC DETERMINATION OF UREA IN WINES WITH IMMOBILIZED ENZYME

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Key words: sequential injection analysis; urea; wine; ion selective electrode

High sampling rates, reduced cost and low maintenance are recognized attributes of continuous flow methods. For wine production and quality control, simple specific direct determinations are then performed¹. However, due to the complexity of the wine matrix, sample pretreatment is usually required. This hinders the routine use of flow procedures especially in view of the higher complexity of the flow network.

Sequential injection analysis has proved to be an advantageous strategy as it allows a good compromise between simplicity and robustness of the manifold even when laborious and time consuming analytical determinations are implemented^{2,3}. Also, the use of ion selective electrodes as a detection device presents the advantage of simplifying sample processing, namely in terms of elimination of the wine color which is a very important requirement in spectrophotometric detection.

The above mentioned aspects were relevant in the determination of the urea content in wines, for which a sequential injection analytical manifold comprising a gas diffusion membrane, an immobilized urease reactor unit, and an ammonium selective electrode was developed.

In the proposed system, the pump was connected to a selecting valve, allowing sample and reagent solutions to be sequentially aspirated, mixed and transported by a flow in reversal mode through a single line towards the immobilized urease unit, where urea was hydrolyzed to ammonia. The ammonia diffused through a hydrophobic membrane and an other pump was used to transport the acceptor stream (10^{-2} M tris-HCl, pH 7.3). The collected ammonia was

converted to ammonium which was further directed towards the flow-through ion selective electrode.

Different wines were analyzed by using the system, and an analytical curve based on urea was run. No interference from the halides by the gas diffusion chamber were observed. Linearity of up to 5×10^{-3} M urea was attained, with small drifts in baseline. Reproducible results were obtained (r.s.d. < 0.05), and higher urea contents were observed for red wines relatively to the white and green wines. The urease reactor has been used for several days with a stable enzyme activity and good repeatability. Comparisons are provided for traditional flow injection methods with the same ammonium selective electrode and urease reactor.

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This work was sponsored by FAPESP/JNICT project 95/4445-7