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Spectrophotometric Determination of Ammonium in Coastal Waters using a Multicommuted Flow Injection System

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In this work, a multi-commuted flow system coupled to a gas diffusion device is described for the spectrophotometric determination of ammonium nitrogen in sea and estuarine waters. The flow system configuration and physical parameters were established according to a previous study for the same determination in fresh waters [1]. The method is based on the conversion of ammonium into ammonia, after mixing the sample with an alkaline carrier solution. Ammonia diffuses over a hydrophobic membrane, causing a pH variation and thus a colour change of the acceptor solution (bromothymol blue), that is measured at 620 nm. The efficiency of complexing agents to prevent precipitation of metallic hydroxides, due to the high pH value of the carrier solution, was studied. Tartrate was selected as the most appropriate complexing agent. Under the optimised conditions, no interference was observed from different expected interfering ions as well as volatile amines. The method provided the determination of NH_4^+ in concentrations ranging from 50 to 1000 $\mu g\ L^{-1}$, with detection and quantification limits of 18 and 35 $\mu g\ L^{-1}$, respectively. A determination rate of 20 h^{-1} was achieved, with good repeatability for 10 consecutive injections of sea and estuarine samples (relative standard deviations lower than 2.0%). Accuracy of the methodology was assessed through recovery assays in 10 samples and also by analysis of certified reference material.

[1] S.M. Oliveira, T.I.M.S. Lopes, I.V. Tóth and A.O.S.S. Rangel, Anal. Chim. Acta, doi:10.1016/j.aca.2007.01.019.

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