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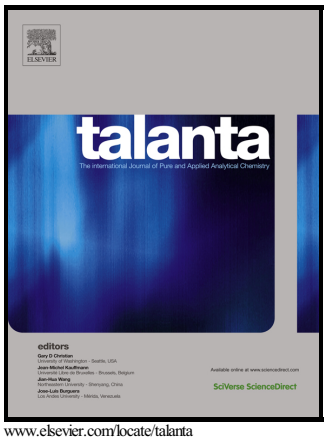

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ACCEPTED MANUSCRIPT

Flow injection with in-line reduction column and conductometric detection for determination of total inorganic nitrogen in soil

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ABSTRACT

A cost effective flow injection (FI) conductometric system has been developed for determination of total inorganic nitrogen (TIN). The system is aimed for evaluation of nitrogen nutrient in soil for agricultural application. Inorganic nitrogen compounds were extracted from soil according to the standard method by using potassium chloride solution as an extractant, and the extracted solution was then injected into the FI system. Nitrate and nitrite are converted to ammonium ion by an in-line reduction column packed with a Devarda's alloy. A gas diffusion unit was incorporated into the FI system to separate ammonium ion from other ions in a donor stream by forming ammonia gas that can diffuse through a PTFE membrane to re-dissolve in an acceptor stream. Conductance of the acceptor stream was directly proportional to ammonium ion concentration. Various parameters affecting reduction efficiency of the column, e.g., column diameter, column packing procedure, and column length was investigated and optimized. A linear calibration graph in the range of 2.00-60.00 mgL^{-1} $N\text{-}NH_4^+$ ($y=0.123x+0.039$, $R^2=0.997$) was obtained with a limit of detection of 1.47 mgL^{-1}. Sample throughput of 20 samples h^{-1} was achieved. The result of developed method was correlated with total Kjeldahl nitrogen (TKN) obtained from

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