SOIL CALCAREOUS EFFICIENCY USING PERVAPORATION COUPLED TO A SEQUENTIAL INJECTION SYSTEM

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Acid soils normally require an amount of calcareous or other base to neutralise the acidity from the initial acidity occurs to selected less acidity. The following between the acidity components; with the enhanced amounts of exchangeable calcium and magnesium, an inactivation of exchangeable aluminium and the increase of the pH occur, giving most favourable plant growth. It is attained with the calcareous application. However, the use of excessive doses of calcium carbonate, associated with the bad distribution and incorporation, can result in the decrease of other nutrients' readiness or the occurrence of some diseases. It is also sometime altered on the basis of economic considerations.

The dissolution of carbonate in acid and determination of the evolved CO_2 is one of the proposed methods for determining residual calcareous. In this work a sequential injection system coupled to a pervaporation unit for the CO_2 condutimetric determination is proposed. With the use of the pervaporation unit it was possible the use of solid samples without previous treatment.

The proposed system was constructed with the use of a six way solenoid valve, a conductivity meter with an RS 232 connection and a PC microcomputer for data acquisition and external controls. The pre-concentration of the CO_2 evolved from the solid samples with the injection of 5.0 mL of 1.0 mol L^{-1} HCl was done after passing through a Teflon® hydrophobic membrane. The CO_2 was then captured by a water acceptor stream and directed to the detector. Amounts of 3.0 g of dry samples were directly weighted in the donor compartment of the pervaporation chamber. The CO_2 amounts in the samples were determined with an analytical curve from 5.0×10^{-3} to 5.0×10^{-2} mol L^{-1} of CO_2. This curve was constructed with the matrix matching approach and showed a linear regression $y = 13.58 + 584.77x (R^2 = 0.9962)$. Eleven soils with different lime amounts were analysed by the proposed methodology and the results were in accordance (slope 1.02 ± 0.03; intersection 6 ± 7) with the official method, that uses calcium difference between the total, extracted with HCl 1.0 mol L^{-1} and exchangeable, extracted with the KCl 1.0 mol L^{-1}. The proposed method presented analytical frequency of 17 samples h^{-1}, detection limit of 8.0×10^{-4} mol L^{-1} of CO_2 and rsd < 3%, and the possibility of the residual calcareous determination without samples pre-treatment.