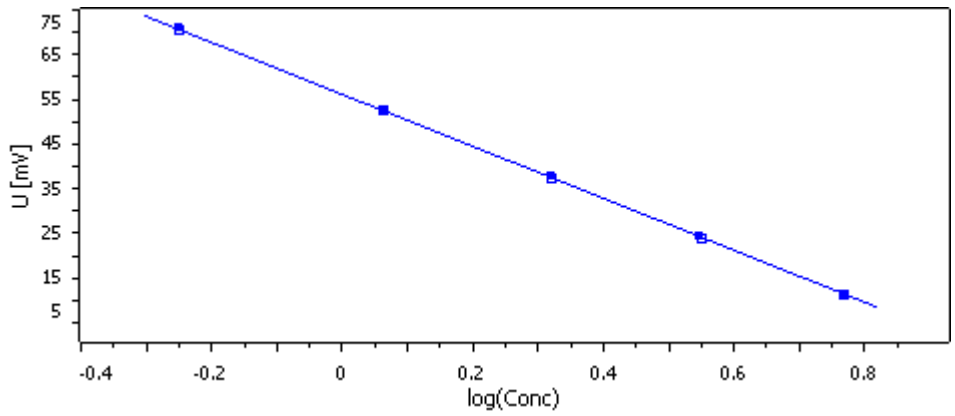
Titration Application Note I-019

Ammonium in Soil

Reliable determination by Standard Addition with NH4 - ISE



Nitrogen is essential for plant growth. In soil, it can be present in the form of nitrate, ammonium, or urea. Knowing the nitrogen content of soil and in which form it is present helps selecting the right kind of fertilizer to stimulate plant growth.

This Application Note shows a fast and reliable way to determine the ammonium concentration in soil by using standard addition.

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Method description

Sample

Soil

Sample preparation

Approx. 30 g dried soil (2 h at 120 °C) is weighed into a 500 mL beaker and 300 mL c(HCl) = 2 mol/L is added. The suspension is boiled for 1 h and allowed to cool down. Afterwards the suspension is filtrated into a 500 mL volumetric flask and filled up to the mark with deion. water.

Configuration

867 pH Module with *tiamo*™ light	2.867.0210
800 Dosino (2x)	2.800.0010
802 Stirrer	2.802.0020
2 mL ETFE Dosing unit	6.1575.120
10 mL Dosing unit	6.3032.210
NH_3 – selective gas membrane electrode	6.0506.100

Solutions

ISA solution c(NaOH) = 10 mol/L	400 g NaOH is dissolved in approx. 500 mL deion. water containing ice cubes made of deion. water. After dissolution, the solution is transferred into a 1 L volumetric flask and filled up to the mark with deion. water.
EDTA solution c(EDTA) = 1 mol/L	29.22 g EDTA is suspended in 50 mL water and c(NaOH) = 10 mol/L is added dropwise until everything is dissolved. Afterwards the solution is transferred into a 100 mL volumetric flask and filled up to the mark with deion. water.

Standard

Titrant / Standard $c(NH_4^+)$ = 0.100 g/L ~ 100 ppm	0.297 g NH_4Cl is weighed into a 1 L volumetric flask, dissolved and filled up to the mark with deion. water.

Analysis

0.5 mL prepared soil solution is pipetted into a 100 mL beaker and 49.5 mL water as well as 1 mL c(EDTA) = 1 mol/L is added. After the addition of 1 mL c(NaOH) = 10 mol/L the standard addition with $\beta(NH_4^+)$ = 100 mg/L is started immediately.

Parameters

Mode	STDADD auto
Stirring rate	6
Number of additions	4
Volume auxiliary solution	51.5 mL
Stop volume	10 mL
Dosing rate	fast
Delta U	12 mV
Signal drift	0.5 mV/min
Min. waiting time	60 s
Max. waiting time	300 s
Measuring interval	2.0 s

Results

Mean results (n = 5)

$w(NH_4^+)$ / %	0.112
s(abs) / %	0.002
s(rel) / %	1.34

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