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Spectroquant®

Ammonium Cell Test

NH_4^+

1. Method

Ammonium nitrogen (NH_4-**N**) occurs partly in the form of ammonium ions and partly as ammonia. A pH-dependent equilibrium exists between the two forms. In strongly alkaline solution ammonium nitrogen is present almost entirely as ammonia, which reacts with hypochlorite ions to form monochloramine. This in turn reacts with a substituted phenol to form a blue indophenol derivative that is determined photometrically.
The method is analogous to EPA 350.1, APHA 4500-NH_3 F, ISO 7150-1, and DIN 38406-5.

2. Measuring range and number of determinations

Measuring range	Number of determinations
4.0 - 80.0 mg/l NH_4-N	25
5.2 - 103.0 mg/l NH_4^+	

For programming data for selected photometers / spectrophotometers see www.service-test-kits.com.

3. Applications

This test measures both ammonium ions and dissolved ammonia.

Sample material:
Groundwater and surface water, seawater
Drinking water
Wastewater
Nutrient solutions for fertilization
Soils and food after appropriate sample pretreatment

4. Influence of foreign substances

This was checked in solutions containing 40 and 0 mg/l NH_4-N. The determination is not yet interfered with up to the concentrations of foreign substances given in the table.

Concentrations of foreign substances in mg/l or %					
Al^{3+}	1000	Mn^{2+}	100	EDTA	1000
Ca^{2+}	1000	Ni^{2+}	250	**Primary amines**[1]	**0**
Cd^{2+}	1000	NO_2^-	1000	Secondary amines[2]	100
CN^-	250	Pb^{2+}	1000	Aminophenols	100
Cr^{3+}	100	PO_4^{3-}	1000	Aniline	250
$Cr_2O_7^{2-}$	1000	S^{2-}	50	Triethanolamine	1000
Cu^{2+}	250	SiO_3^{2-}	1000	Surfactants[3]	1000
F^-	1000	Zn^{2+}	500	Na-acetate	10 %
Fe^{3+}	250			NaCl	20 %
Hg^{2+}	500			$NaNO_3$	20 %
Mg^{2+}	500			Na_2SO_4	20 %

Reducing agents interfere with the determination.

[1] tested with methylamine
[2] tested with dimethylamine
[3] tested with nonionic, cationic, and anionic surfactants

5. Reagents and auxiliaries

Please note the warnings on the packaging materials!

The test reagents are stable up to the date stated on the pack when stored closed at +15 to +25 °C.

Package contents:
1 bottle of reagent NH_4-1K (contains granulate + desiccant capsule)
25 reaction cells
1 blue dose-metering cap
1 sheet of round stickers for numbering the cells

Other reagents and accessories:
MQuant™ Ammonium Test, Cat. No. 110024,
measuring range 10 - 400 mg/l NH_4^+ (8 - 311 mg/l NH_4-N)
MColorpHast™ Universal indicator strips pH 0 - 14, Cat. No. 109535
Sodium hydroxide solution 1 mol/l TitriPUR®, Cat. No. 109137
Sulfuric acid 0.5 mol/l TitriPUR®, Cat. No. 109072
Spectroquant® CombiCheck 70, Cat. No. 114689
Ammonium standard solution CRM, 6.00 mg/l NH_4-N, Cat. No. 125025
Ammonium standard solution CRM, 12.0 mg/l NH_4-N, Cat. No. 125026
Ammonium standard solution CRM, 50.0 mg/l NH_4-N, Cat. No. 125027

Pipette for a pipetting volume of 0.10 ml

6. Preparation

- Rinse glassware ammonium-free with distilled water. **Do not use detergent!**

At the first use **replace the screw cap of the reagent bottle NH_4-1K by the blue dose-metering cap**.
Hold the reagent bottle **vertically** and, at each dosage, press the slide **all the way** into the dose-metering cap. **Before each dosage** ensure that the slide is **completely retracted**.

⚠ **Reclose the reagent bottle with the screw cap at the end of the measurement series, since the function of the reagent is impaired by the absorption of atmospheric moisture.**

- Analyze immediately after sampling.
- Check the ammonium content with the MQuant™ Ammonium Test. Samples containing more than 80.0 mg/l NH_4-N must be diluted with distilled water.
- **The pH must be within the range 4 - 13.**
  Adjust, if necessary, with sodium hydroxide solution or sulfuric acid.
- Filter turbid samples.

7. Procedure

Pretreated sample (**20 - 30 °C**)	0.10 ml	Pipette into a reaction cell (**20 - 30 °C**), close the cell, and mix.
Reagent NH_4-1K	1 dose	Add, close the cell tightly, and shake **vigorously until the reagent is completely dissolved**.
Leave to stand for 15 min (reaction time), then measure the sample in the photometer.		

Notes on the measurement:

- For photometric measurement the cells must be clean.
  Wipe, if necessary, with a clean dry cloth.
- Measurement of turbid solutions yields false-high readings.
- Ammonium-free samples turn yellow on addition of reagent NH_4-1K.
- The pH of the measurement solution must be within the range 11.5 - 11.8.
- The color of the measurement solution remains stable for at least 60 min after the end of the reaction time stated above.
- In the event of ammonium concentrations exceeding 5000 mg/l, other reaction products are formed and false-low readings are yielded. In such cases it is advisable to conduct a plausibility check of the measurement results by diluting the sample (1:10, 1:100).

8. Analytical quality assurance

recommended before each measurement series
To check the photometric measurement system (test reagent, measurement device, handling) and the mode of working, the ammonium standard solutions CRM, 6.00 mg/l NH_4-N, Cat. No. 125025, 12.0 mg/l NH_4-N, Cat. No. 125026, and 50.0 mg/l NH_4-N, Cat. No. 125027 or Spectroquant® CombiCheck 70 can be used. Besides a **standard solution** with 50.0 mg/l NH_4-N, CombiCheck 70 also contains an **addition solution** for determining sample-dependent interferences (matrix effects).
Additional notes see under **www.qa-test-kits.com**.

Characteristic quality data:

In the production control, the following data were determined in accordance with ISO 8466-1 and DIN 38402 A51:

Standard deviation of the method (mg/l NH_4-N)	± 0.48
Coefficient of variation of the method (%)	± 1.2
Confidence interval (mg/l NH_4-N)	± 1.2
Number of lots	42

Characteristic data of the procedure:

Sensitivity: Absorbance 0.010 A corresponds to (mg/l NH_4-N)	0.4
Accuracy of a measurement value (mg/l NH_4-N)	max. ± 1.9

For quality and batch certificates for Spectroquant® test kits see the website.

9. Notes

- Reclose the reagent bottle immediately after use.
- **Information on disposal can be obtained at www.disposal-test-kits.com.**

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