1.14752.0001
1.14752.0002

Spectroquant®

Ammonium 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 a chlorinating agent to form monochloramine. This in turn reacts with thymol 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

Cell	Measuring range		Number of determinations
mm	mg/l NH_4-N	mg/l NH_4^+	
50	**0.010** - 0.500	**0.013** - 0.644	250 (Cat No. 1.14752.0002) or 500 (Cat. No. 1.14752.0001)
20	0.03 - 1.50	0.04 - 1.93	
10	0.05 - **3.00**	0.06 - **3.86**	

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[1)]
Drinking water
Wastewater
Aquarium water
Nutrient solutions for fertilization
Soils and food after appropriate sample pretreatment
(Applications see the website)

[1)] To determine the concentration of ammonium in seawater 0.1 ml of sodium hydroxide solution 5 mol/l must be added **after** the addition of reagent NH_4-1. Subsequently proceed as described in section 7 ("Procedure").

4. Influence of foreign substances

This was checked in solutions containing 2 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	Mg^{2+}	100	EDTA	500
Ca^{2+}	1000	**Mn^{2+}**	**10**	**Primary amines**[1)]	**0**
Cd^{2+}	100	Ni^{2+}	100	**Secondary amines**[2)]	**0**
CN^-	**1**	NO_2^-	100	Surfactants[3)]	500
Cr^{3+}	100	Pb^{2+}	1000	Na-acetate	10 %
$Cr_2O_7^{2-}$	1000	PO_4^{3-}	100	NaCl	10 %
Cu^{2+}	**10**	**S^{2-}**	**1**	$NaNO_3$	20 %
F^-	**10**	SiO_3^{2-}	500	Na_2SO_4	20 %
Fe^{3+}	100	Zn^{2+}	100		
Hg^{2+}	100				

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:
Reagent NH_4-1: 1 bottle
Reagent NH_4-2: 2 bottles (Cat. No. 1.14752.0002) or
3 bottles (Cat. No. 1.14752.0001)
Reagent NH_4-3: 1 bottle
1 AutoSelector

Other reagents and accessories:
Sodium hydroxide solution 1.000 l Combi-Titrisol®, 5 mol/l, Cat. No. 109913
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 50, Cat. No. 114695
Ammonium standard solution CRM, 0.400 mg/l NH_4-N, Cat. No. 125022
Ammonium standard solution CRM, 1.00 mg/l NH_4-N, Cat. No. 125023
Ammonium standard solution CRM, 2.00 mg/l NH_4-N, Cat. No. 125024

Pipettes for pipetting volumes of 0.60 and 5.0 ml
Rectangular cells 10, 20, and 50 mm (2 of each), Cat. Nos. 114946, 114947, and 114944
Semi-microcells 50 mm (2 pcs), Cat. No. 173502

6. Preparation

- Rinse glassware ammonium-free with distilled water. **Do not use detergent!**
- Analyze immediately after sampling.
- **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**)	5.0 ml	Pipette into a test tube.
Reagent NH_4-1 (**20 - 30 °C**)	0.60 ml	Add with pipette and mix.
Reagent NH_4-2	1 level blue microspoon (in the cap of the NH_4-2 bottle)	Add and shake **vigorously until the reagent is completely dissolved**.
Leave to stand for 5 min (reaction time A).		
Reagent NH_4-3	4 drops[1)]	Add and mix.
Leave to stand for 5 min (reaction time B), then fill the sample into the cell, and measure in the photometer.		

[1)] **Hold the bottle vertically while adding the reagent!**

For measurement in the **50-mm cell** both the sample volume as well as the quantities of reagents NH_4-1, NH_4-2, and NH_4-3 must be doubled. Alternatively, the semi-microcell Cat. No. 173502 can be used.

Notes on the measurement:

- **Certain photometers may require a blank** (preparation as per measurement sample, but with distilled water instead of sample).
- 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_4-3.
- The pH of the measurement solution must be approx. 12.5.
- The color of the measurement solution remains stable for at least 60 min after the end of the reaction time B stated above.
- In the event of ammonium concentrations exceeding 100 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, 0.400 mg/l NH_4-N (Cat. No. 125022), 1.00 mg/l NH_4-N (Cat. No. 125023), and 2.00 mg/l NH_4-N (Cat. No. 125024) or Spectroquant® CombiCheck 50 can be used. Besides a **standard solution** with 1.00 mg/l NH_4-N, CombiCheck 50 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 (10-mm cell):

Standard deviation of the method (mg/l NH_4-N)	± 0.023
Coefficient of variation of the method (%)	± 1.5
Confidence interval (mg/l NH_4-N)	± 0.06
Number of lots	40

Characteristic data of the procedure:

	Measuring range mg/l NH_4-N	
	0.010 - 0.500	**0.05 - 3.00**
Sensitivity: Absorbance 0,010 A corresponds to (mg/l NH_4-N)	0.002	0.01
Accuracy of a measurement value (mg/l NH_4-N)	max. ± 0.016	max. ± 0.08

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

9. Notes

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

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