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EZ4005 Ammonia analyser

Method and reagent sheets

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1. Legal information

Manufacturer: AppliTek NV/SA

Distributor: Hach Lange GmbH

The translation of the manual is approved by the manufacturer.

2. Analytical specifications

Please refer also to the respective technical datasheet at Hach Support Online.

Ammonia - All specifications				
Analysis method	Acid-base titration with sodium hydroxide			
Parameter	Ammonia			
Cycle time	Standard measurement cycle time: 15 minutes			
Limit of detection (LOD)	≤ 10 mg/L			
Precision/Repeatability	Better than 2 % full scale range for standard test solutions			
Cleaning	Automatic)			
Calibration	Automatic, 1-point; frequency freely programmable			
Validation	Automatic; frequency freely programmable			
Interferences	Soaps, oily matter, suspended solids or precipitates may coat the glass electrode and cause a sluggish response. Allow additional time between titrant additions to let the electrode come to equilibrium or clean the electrodes occasionally.			
Measuring range	% of range - Dilution		Low range (mg/L)	High range (mg/L)
	A	10% of standard range	10	500
	B	25% of standard range		
	C	50% of standard range	50	2500
	0	standard range	100	5000
	1	internal MP dilution (factor 4)		
	2	internal MP dilution (factor 8)		
	3	internal MP dilution (factor 10)		
	4	internal MP dilution (factor 20)		
	V	internal dispenser dilution (factor 5)		
	W	internal dispenser dilution (factor 10)		
	X	internal dispenser dilution (factor 25)		
	Y	internal dispenser dilution (factor 50)		
Z	internal dispenser dilution (factor 75)			
5	internal dispenser dilution (factor 100)			

3. Analysis method

Summary

The determination of the ammonia concentration in water is based on an acid-base titration using a pH electrode. The sample is titrated with sodium hydroxide (NaOH). After the determination of the end point, the ammonia concentration is calculated.

Analysis steps

The analysis vessel is cleaned and filled with fresh sample. After sampling, the initial pH value is measured and adjusted with sulfuric acid (H₂SO₄). Next, the titration with sodium hydroxide (NaOH) is started. After the determination of the end point, the ammonia concentration is calculated.

Calibration


The calibration procedure measures a REF2 NH₄ solution (channel 10, Validation valve) to adapt the slope factor by means of a one point calibration.


The calibration is performed in the MAIN method.

Remark

The methods cannot be started at the same time.

4. Reagents

⚠ CAUTION	
	Chemical exposure hazard. Obey laboratory safety procedures and wear all of the personal protective equipment appropriate to the chemicals that are handled. Read the safety data sheet from the supplier before bottles are filled or reagents are prepared. For laboratory use only. Make the hazard information known in accordance with the local regulations of the user.

⚠ CAUTION	
	Chemical exposure hazard. Dispose of chemicals and wastes in accordance with local, regional and national regulations.

4.1 Reagent overview and consumption

In the tables below, the products that are needed to prepare the reagents are listed. The product name, the formula, the molecular weight, the CAS No. and the amount needed to prepare 1 liter of the reagents is given. Check the consumption of the reagents (28 days) to adapt the volumes needed.

Product	Consumption	Consumption/28 days A rata 1 analysis/60 min	Recommended containers
H₂SO₄ solution	~ 1.0 mL / analysis depending on alkalinity	~ 2.7 L	Plastic – 5L
NaOH solution	Depending on concentration	0.5 < Volume < 13.5 L	Plastic – 10 L
REF2 Solution	~ 1 L / calibration	/	Plastic – 2.5 L

*This solution is stable for 4 weeks

4.2 DI-water overview and consumption

	Rinse water Quality	Rinse water (mL/analysis)	Consumption/28 days A rata 1 analysis / 15 minutes
A	Tapwater	80 mL	215 L
C	Tapwater	80 mL	215 L
0	Tapwater	80 mL	215 L

Remark

The indicated volumes are an estimation of the consumption for rinse and dilution water, based on a standard operating procedure, as defined in the specifications of the EZ analyser. Please be aware that, depending on the sample matrix, the rinse water volumes might increase.

4.3 Storage and quality of chemicals

Quality of chemicals

All chemicals should be of Reagent grade, ACS grade or better (*). The use of pro analysis chemicals is recommended. Poor quality of the reagents can affect the analyser performance.

(* Analytical Reagent (AR), Guaranteed Reagent (GR), UNIVAR, AnalaR, Premium Reagent (PR), ReagentCertified ACS reagent, ACS Plus reagent, puriss p.a. ACS reagent, ReagentPlus®, TraceCERT®, Suprapur®, Ultrapur®, or better are also possible.

Quality of DI-water

All EZ analysers are tested with standard solutions, reagents and dilution water prepared using type I water or better as defined by ASTM D1193-91.

To achieve the specifications as stated on the data sheet, method and reagents sheet and acceptance test reports, the same water quality (or better) must be used for the preparation of the standard solutions, reagents and dilution water.

Additionally the water used for the preparation of the standard solutions for an EZ analyser must be free of the parameter or any of the interferences for the method of that EZ analyser.

Storage of Reagents

While operating the instrument, keep in mind the ambient temperature conditions as stated in the data sheet of the instrument.

⚠ CAUTION

Store the reagents cold; Store the reagents in the dark;
If applicable: Store the reagents in a fridge during operation

⚠ CAUTION

Refresh the reagents after one month (unless stated differently in the chapters below).
Do not mix old reagents with freshly prepared reagents. Remove old reagents from the container before adding freshly prepared reagents.

4.4 H₂SO₄ solution

Products	Formula	MW (g/mol)	CAS No.	1 litre solution
Sulfuric acid 96%	H ₂ SO ₄	98.08	7664-93-9	5.58 ml

Preparation

Dilute x ml of sulfuric acid (H₂SO₄, 96 %) in 500 ml of de-ionized water using a volumetric flask of 1000 ml. Mix and add de-ionized water.

	Measuring range	Alkalinity range	Concentration H ₂ SO ₄ solution	Amount to add to 1 litre
A	500 mg/L NH ₄	4 g/l CaCO ₃	0.2 M	11.16 ml
C	2500 mg/L NH ₄	10 g/l CaCO ₃	0.5 M	27.9 ml
0	5000 mg/L NH ₄	20 g/l CaCO ₃	1 M	55.8 ml

4.5 NaOH solution

Products	Formula	MW (g/mol)	CAS No.	1 litre solution
Sodium hydroxide	NaOH	40.00	1310-73-2	x

Preparation

Prepare a x M sodium hydroxide (NaOH) solution. Add carefully x g sodium hydroxide (NaOH) to 500 ml de-ionized water and dilute to 1 litre with de-ionized water.

	Measuring range	Concentration NaOH solution	Amount to add to 1 litre
A	500 mg/L NH ₄	0.1 M	4.0 g
C	2500 mg/L NH ₄	0.25 M	10 g
0	5000 mg/L NH ₄	0.5 M	20 g

4.6 Calibration solution

Products	Formula	MW (g/mol)	CAS No.	1 litre solution
Ammonium chloride	NH ₄ Cl	53.49	12125-02-9	148.528 g

Preparation:

50000 mg/L NH₄ stock solution

Dissolve accurately 148.528 g ammonium chloride (NH₄Cl) in 600 ml de-ionized water, using a volumetric flask of 1000 ml. Add de-ionized water up to the mark grade

Ammonia standard solution – REF2

Prepare a standard solution for calibration according to the following table: take accurately x mL of the 50000 mg/L NH₄ stock solution and transfer into a volumetric flask of 1 litre. Add de-ionized water up to the mark grade.

	Measuring range	Concentration REF2	Amount to add to 1 litre
A	500 mg/L NH ₄	500 mg/L NH ₄	10 mL
C	2500 mg/L NH ₄	2500 mg/L NH ₄	50 mL
0	5000 mg/L NH ₄	5000 mg/L NH ₄	100 mL

4.7 Cleaning solution (facultative)

The cleaning procedure should prevent any build-up of chemicals in the analyser. To obtain an effective cleaning procedure one has to test the cleaning solution and the cleaning interval for each application. Perform the selected cleaning solution and interval for a trial period, check then the effectiveness of the procedure and change if necessary.

Change Information	
Date: 02/04/2021	Previous version: Edition 2 Nov20
Reason for Change	
ECR Request	
Description of Change	
<ul style="list-style-type: none">- Extra H₂SO₄ concentrations are added to cover higher alkalinity- Tapwater can be used for rinsing- Number of articles available are reduced to 0 A C	