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EZ4004 Total Alkalinity 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.

Total Alkalinity - All specifications				
Analysis method	Acid-base titration with hydrochloric acid			
Parameter	Total alkalinity (CaCO ₃)			
Cycle time	10 – 15 minutes			
Limit of detection (LOD)	≤ 10 mg/L			
Precision/Repeatability	Better than 2% full scale range for standard test solutions			
Cleaning	Automatic; frequency freely programmable			
Calibration	Automatic; one point calibration			
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 ranges	% of range - Dilution		Low range (mg/L)	High range (mg/L)
	A	10% of standard range	10	500
	B	25% of standard range	25	1250
	C	50% of standard range	50	2500
	0	standard range	100	5000
	V	Internal dispenser dilution factor 5	500	25000
	W	Internal dispenser dilution factor 10	1000	50000

3. Analysis method

Summary

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

Analysis steps

The analysis vessel is cleaned and filled with fresh sample. After sampling, the initial pH value is measured. Next, the titration with hydrochloric acid (HCl) is started. After the determination of the end point (pH 4.5), the alkalinity concentration is calculated.

Calibration


The calibration procedure measures a REF2 CaCO₃ 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 litre 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/15 min	Recommended containers
HCl solution	Depending on total alkalinity concentration	1 L < Volume < 27 L	Plastic – 10 L
REF2 Solution	~ 1 L / calibration	/	Plastic – 2.5 L

4.2 Storage and quality of chemicals

Quality of chemicals

All chemicals should be of ACS grade or better. We recommend the use of pro analysis chemicals.

Quality of water

Reagent grade, carbon dioxide-free de-ionized water must be used to prepare the chemical solutions and for rinse purposes.

Storage of Reagents

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

Store the reagents cold; Store the reagents in the dark; Refresh the reagents after one month (unless stated differently in the chapters below).

4.3 HCl solution

Products	Formula	MW (g/mol)	CAS No.	1 litre solution
Hydrochloric acid (1M)	HCl	36.46	7647-01-0	x mL

Preparation

Prepare a x M hydrochloric acid (HCl) solution according to the following table: Add carefully x mL hydrochloric acid (HCl 1M) to 500 mL de-ionized water and dilute to 1 litre with de-ionized water.

	Measuring range	Concentration HCl solution	Amount to add to 1 litre
A	500 mg/L CaCO ₃	0.025 M	25 mL
B	1250 mg/L CaCO ₃	0.05 M	50 mL
C	2500 mg/L CaCO ₃	0.1 M	100 mL
0	5000 mg/L CaCO ₃	0.2 M	200 mL
V	25000 mg/L CaCO ₃	0.2 M	200 mL
W	50000 mg/L CaCO ₃	0.2 M	200 mL

4.4 Calibration solution

Products	Formula	MW (g/mol)	CAS No.	Range	1 litre solution
Sodium carbonate	Na ₂ CO ₃	105.99	497-19-8	0 – 5000 mg/L CaCO ₃	52.995 g
				> 5000 mg/L CaCO ₃	264.98 g

Preparation:

Range 0 – 5000 mg/L CaCO₃

50000 mg/L CaCO₃ stock solution

Dissolve accurately 52.995 g sodium carbonate (Na₂CO₃) in 800 mL de-ionized water, using a volumetric flask of 1 litre. Add de-ionized water up to the mark grade.

CaCO₃ standard solution – REF2

Prepare a standard solution for calibration according to the following table: take accurately x mL of the 50000 mg/L CaCO₃ stock solution and transfer into a volumetric flask of 1 litre. Add de-ionized water up to the mark grade.

	Measuring range	Concentration REF2 solution	Amount to add to 1 litre
A	500 mg/L CaCO ₃	500 mg/L CaCO ₃	10 mL
B	1250 mg/L CaCO ₃	1250 mg/L CaCO ₃	25 mL
C	2500 mg/L CaCO ₃	2500 mg/L CaCO ₃	50 mL
0	5000 mg/L CaCO ₃	5000 mg/L CaCO ₃	100 mL

Range > 5000 mg/L CaCO₃**250000 mg/L CaCO₃ stock solution**

Dissolve accurately 264.98 g sodium carbonate (Na₂CO₃) in 800 mL de-ionized water, using a volumetric flask of 1 litre. Add de-ionized water up to the mark grade.

CaCO₃ standard solution – REF2

Prepare a standard solution for calibration according to the following table: take accurately x mL of the 250000 mg/L CaCO₃ stock solution and transfer into a volumetric flask of 1 litre. Add de-ionized water up to the mark grade.

	Measuring range	Concentration REF2 solution	Amount to add to 1 litre
V	25000 mg/L CaCO ₃	25000 mg/L CaCO ₃	100 mL
W	50000 mg/L CaCO ₃	50000 mg/L CaCO ₃	250 mL

4.5 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