Determination of Calcium and Magnesium in Water

Description

The determination of the Calcium and Magnesium next together in water is done by titration with the sodium salt of ethylenediaminetetraethanoic acid (EDTA) at pH 8 - 9, the detection is carried out with a Ca electrode. The result is calculated as mg/l Ca^{2+} respectively mg/l Mg^{2+}.

Instruments

Titrator	TL 7000 or higher
Electrode	Ca 1100 PLH
Cable	L 1 A
Reference electrode	B 2920+
cable	L 1 N
Stirrer	Magnetic stirrer TM 235 or similar
Lab accessory	Glass beaker 150 ml
	Magnetic stirrer bar 30 mm

Reagents

1	Na_2EDTA 0.05 or 0.1 mol/l
2	Acetylacetone
3	Tris(hydroxymethyl)-aminomethane (TRIS)
4	Distilled Water
5	Electrolyte solution L300
All reagents should be of analytical grade or better.	

Titration procedure

Reagents

The titer determination of the EDTA solution is carried out as described in the application note "Titer determination of EDTA".

TRIS / Acetylacetone Buffer solution
Dissolve 20.4 g of TRIS in water, add 12 ml of Acetylacetone and make up to 1.0 liter with water.

Cleaning of the electrode

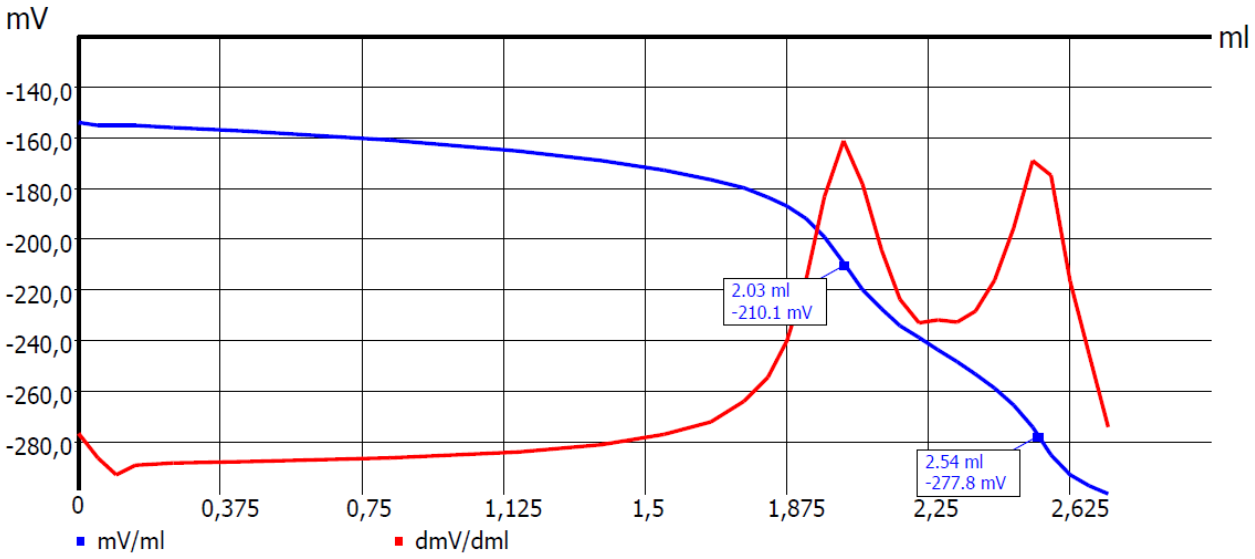
The electrodes are cleaned with distilled water. The Ca 1100 is stored clean and dry, for the storage of the reference electrode use electrolyte solution L300.

Sample preparation

100.00 ml of sample are placed in a 150 ml beaker, 15 ml TRIS / Acetylacetone buffer solution are added. Then it is titrated with Na_2EDTA 0.05 or 0.1 mol / l to 2 equivalence points. The first equivalence point corresponds to the Ca^{2+} content, the second to the Mg^{2+} content of the sample. The consumption should be about 5 - 15 ml. For very hard water samples, the amount of sample may be reduced, for very soft water samples, a lower concentration EDTA solution may be needed.

Titration parameter

Sample titration



Default method	Ca and Mg		
Method type	Automatic titration		
Modus	Dynamic		
Measured value	mV		
Measuring speed / drift	User defined	Minimum holding time	5 s
		Maximum holding time	12 s
		Measuring time	4 s
		Drift	3 mV/min
Initial waiting time	0 s		
Dynamic	flat	Max step size	0.5 ml
		Slope max ml	10
		Min. step size	0.05 ml
		Slope min. ml	120
Damping	none	Titration direction	decrease
Pretitration	off	Delay time	0 s
End value	off		
EQ	On (1)	Slope value	120
Max. titration volume	20 ml		
Dosing speed	100%	Filling speed	30 s

Calculation:

$$Result\ Ca^{2+}\ [mg/l] = \frac{(EQ1 - B) * T * M_{Ca} * F1}{V * F2}$$

$$Result\ Mg^{2+}\ [mg/l] = \frac{(EQ2 - EQ1) * T * M_{Mg} * F1}{V * F2}$$

B	0	Blank value
EQ1		Consumption of titrant at first Equivalence point
EQ2		Consumption of titrant at second Equivalence point
T	WA	Actual concentration of the titrant
M_{Ca}	40,08	Molecular mass of Ca
M_{Mg}	24,305	Molecular mass of Mg
V	man	sample volume [ml]
F1	1000	Conversion factor
F2	1	Conversion factor

Any questions? Please contact the application team:

Xylem Analytics Germany Sales GmbH & Co. KG, SI Analytics
Hattenbergstraße 10
D-55122 Mainz, Germany
Telefon: + 49 6131 66 5126
Fax: + 49 6131 66 5101
E-Mail: titration@si-analytics.com