AQUACOUNTER Application Sheet	COM series	DATA No. D3	1st edition
Environmental	Titration of calcium hardness in drinking water		

1. Measurement outline

Hardness of water is expressed as the total hardness as the level of calcium and magnesium ions converted into mg/L of calcium carbonate ($CaCO_3$) and calcium hardness which is obtained by measuring calcium ion alone.

Though the method for measuring calcium hardness is similar to that of the total hardness, it is measured by adjusting the pH value of sample water to pH12 or higher using sodium hydroxide and titrating with 2-hydroxy-1-(2-hydroxy-4-sulfo-1-naphthylazo)-3-naphtoic acid (abbreviated as NN indicator hereafter) indicator with masking on the reaction between magnesium and EDTA (red → blue).

$$CaCO_3 + Na_2EDTA \rightarrow CaEDTA + Na_2CO_3$$

This section introduces the example in which calcium hardness was measured by photometric titration with EDTA titrant according to the test method for drinking water.

2. Reagents and Electrodes

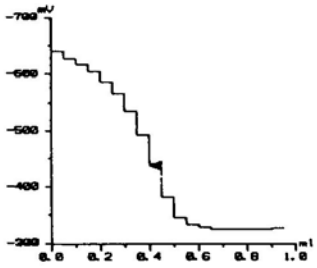
(1) Reagents	Titrant	0.01mol/L EDTA titrant
	Buffer	28% (W/V) sodium hydroxide solution
	Indicator	NN indicator
(2) Electrodes	Photometric probe with 650nm filter	

3. Measurement conditions example (for COM-1600M w/ Photometric unit)

Master File No.1 Condition file: 1	
Parameters for Condition file 1	
Method	Auto
Amp No.	2
Buret No.	1
Meas Unit	mg/L
S-Timer	10 sec
CP	0 mL
DP	0 mL
Direction	N/A
End Sens	200
Over mL	0.50 mL
Max Vol	20 mL
Mode No.	15
Unit	mg/L
Formula	(D-B)×1000/S
Blank	0
Molarity	0.01
Factor	Titer of the titrant
K	0

Mode No.15	
Pre Int	0 sec
Del K	0
Del Sens	0 mV
Int Time	5 sec
Int Sens	3 mV
Brt Speed	2
Pulse	8

4. Measurement example



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Initial      -639.5 mV
Temp          20.0 °C

EP           -436.1 mV
              0.402 ml
dE/dV          1033
SIZE       20.00000 g
*Conc      20.1000 mg/l
```

Measurement results on calcium hardness of running water

Sample No.	Sample volume (mL)	Titration value (mL)	Calcium hardness ($CaCO_3$mg/L)
1	20	0.392	19.1
2	20	0.413	20.7
3	20	0.401	20.1
4	20	0.402	20.1
5	20	0.407	20.4
6	20	0.402	20.1
7	20	0.393	19.7
8	20	0.406	20.3
	Avg.		20.1 $CaCO_3$mg/L
	Std. Dev.		0.48 $CaCO_3$mg/L
	C.V.		2.41 %

5. Note

1) About sample collection volume

The test method for drinking water stipulates the sample collection volume as 100mL. In this section, the sample was measured at 1/5 (20mL) of the specified volume for the purpose of analysis automation and results were obtained within approximately 3% coefficient of variation.

Key words

Hardness, calcium hardness, chelatometric titration,

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