

AQUACOUNTER Application Sheet	COM series	DATA No. D2	1st edition
Environmental	Measurement of total hardness of drinking water		

1. Measurement outline

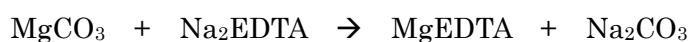
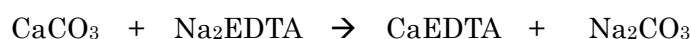
Hardness of water is expressed as the level of calcium and magnesium ions converted into mg/L of calcium carbonate (CaCO_3).

There are 5 types of hardness as follows:

- (1) Total hardness Total level of calcium and magnesium
- (2) Calcium hardness Calcium
- (3) Magnesium hardness Total hardness – calcium hardness
- (4) Non-carbonate salt hardness (permanent hardness)
- (5) Carbonate salt hardness (temporary hardness)

As applicable standards, it is stipulated in the test method for drinking water, Standard Methods of Analysis for Hygienic Chemists, JISK0101, etc.

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



2. Reagents and Electrodes

(1) Reagents	Titrant	0.01mol/L EDTA titrant
	Buffer	pH10 ammonia buffer NH_4Cl 67.5g } Diluted to 1L with NH_4OH 570mL } Deionized water
	Magnesium chloride solution	0.0213mol/L magnesium chloride solution
	Indicator	EBT indicator
(2) Electrodes	Photometric probe with 650nm filter	

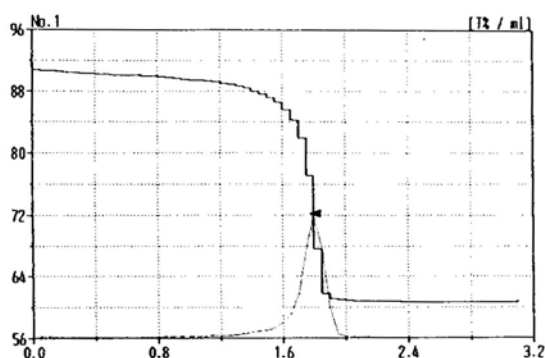
3. Measurement conditions example (for COM-1600M w/ Photometric unit)

Master File No.1	
Condition file: 1	
Parameters for Condition file 1	
Method	AUTO
Amp No.	2
Buret No.	1
Meas Unit	T%
S Timer	10 sec
CP	0 mL
DP	0.5 mL
End Sens	500
Over mL	1.00 mL
Max Vol	40 mL
Mode No.	20
Unit	ppm
Formula	$(D-B) \times 1000/S$
Blank	*BLANK result value
Molarity	0.01
Factor	Titer of the titrant
K	0

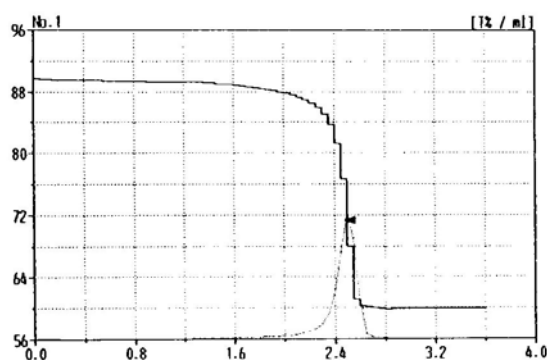
Mode No.20	
Pre Int	1 sec
Del K	2
Del Sens	0 mV
Int Time	5 sec
Int Sens	3 mV
Brt Speed	2
Pulse	10

4. Procedure

20mL of sample was collected and added with 100mL of deionized water, 1mL of magnesium chloride, 2mL ammonia buffer and 0.5mL EBT indicator for titration with 0.01mol/L EDTA titrant (red → blue). Blank measurement is conducted by collecting 20mL of deionized water instead of the sample under identical operation as sample measurement.

5. Measurement example**Results of blank measurement**

Sample No.	Sample volume (mL)	Titration value (mL)
1	1	1.7760
2	1	1.7770
Avg.		1.7765 mL



Measurement results on sample water

Sample No.	Sample volume (g)	Titration value (mL)	Concentration (ppm)
1	10	2.480	70.4
2	10	2.508	73.2
3	10	2.493	71.7
Avg.			71.8 ppm
Std. Dev.			1.40 ppm
C.V.			1.95 %

6. Note

1) Magnesium chloride solution and blank measurement

The magnesium chloride solution used in this test was adjusted to 0.02mol/L. Caution is required since the test method for drinking water stipulates so that 0.01mol/L is used.

Key words

Hardness, total hardness, photometric titration, chelatometric titration

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