

Sheet No.

GT200-WA012 Wastes

Calcium Hardness (Magnesium Hardness) Analysis of Tap Water

1/3

Method : Chelatometric titration (photometric detection)
 Apparatus : Automatic Titrator GT-200
 Photometric detector GT-LDII
 Interference filter wavelength 620 nm
 Titration mode : CROSS-B, Detection: mV
 Related standard : Standard Methods for the Examination of Water Hardness Calcium hardness

*This sheet is provided as information. It is not to guarantee the analysis values. Please use under the ideal conditions considering external factors including the analysis environment and properties of the sample.

Outline

For calcium hardness, pH of tap water is adjusted to 12 or higher and the hardness is measured for calcium only using a calcium indicator. Magnesium hardness is derived by subtracting calcium hardness from total hardness. Calcium hardness analysis of tap water is carried out by chelate titration (photometric detection).

Reagents

[Titrant]

■0.01 mol/L EDTA solution (for testing and research)

[Reagents]

■28w/v% sodium hydroxide solution: Dissolve 28 g of sodium hydroxide in pure water and volume up to 100 ml.

■10w/v% potassium cyanide solution: Dissolve 1 g of potassium cyanide in pure water and volume up to 10 ml.

■10w/v% hydroxylamine hydrochloride solution: Dissolve 10 g of hydroxylamine hydrochloride in pure water and volume up to 100 ml.

[Indicator]

■NN diluted with potassium sulfate (commercial product)

Analytical Procedure

- (1) Place 100 ml of tap water into a 200-ml beaker using a measuring cylinder.
- (2) Add 9 ml of 28w/v% sodium hydroxide solution.
Add 5 drops of 10w/v% potassium cyanide solution. (Masking of copper, iron, and zinc)
- (3) **HANDLE THE REAGENT WITH CARE!**
- (4) Add 5 drops of 10w/v% hydroxylamine hydrochloride solution.
(Add when a large amount of iron exists in the tap water.)
- (5) Stir, and leave to stand for several minutes. (This time, left standing for 5 minutes (measured))
- (6) Immediately add and dissolve 0.1 g of NN diluted with potassium sulfate, and titrate using 0.01 mol/L EDTA solution. (Reddish purple → Blue)

Sheet No.

GT200-WA012 Calcium Hardness (Magnesium Hardness) Analysis of Tap Water ——— 2/3

[Equation]

Calcium hardness (CaCO₃ mg/L) = A1 × (1000 / S) × 1
Magnesium hardness (CaCO₃ mg/L) = [Average total hardness] - [Average calcium hardness]

A1 : Titer of 0.01 mol/L EDTA solution to the end point (ml)

S : Sample amount (ml)

Other Requirements

- Bring the tap water to room temperature prior to measurement. Low water temperature may delay the color change of indicator.
 - **Pay attention to handling methods and storage of reagents when using 10w/v% potassium cyanide solution.**
 - Handle measurement reagents with care after reading through and understanding their labels and safety data sheets.
 - Wear personal protective equipment such as protective goggles and gloves when handling the reagents.
- Measurement Results.

Measurement Results

	Sample amount (ml)	Titer (ml)	Measurement value (mg/L)
1	100	4.4529	44.5
2		4.4429	44.4
3		4.4601	44.6

Number of data	(n)	3
Average		44.5
Standard deviation	(SD)	0.0864
Relative standard deviation	(RSD%)	0.1940

Calcium hardness of tap water was measured using GT-200. Average over 3 measurements was 44.5 mg/L. Relative standard deviation (RSD%) was 0.19%, exhibiting measurement with relatively high reproducibility.

Sheet No.

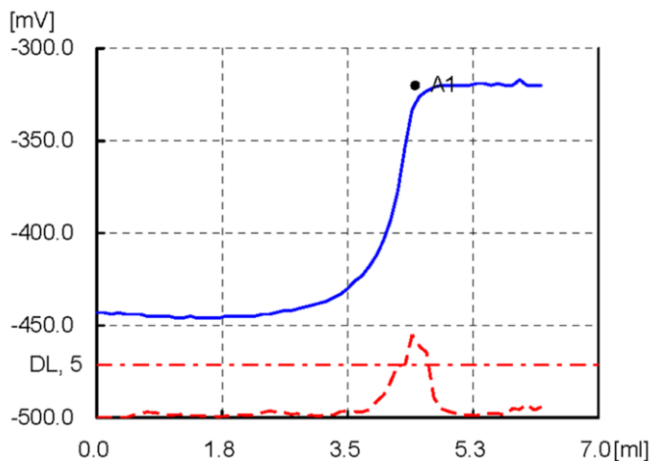
GT200-WA012 Calcium Hardness (Magnesium Hardness) Analysis of Tap Water — 3/3

ID No.: 8 GT No.1

User: GT-200

Measurement date : 2013/03/06 16:37
 Sample name : Service water

Measurement type : Sample Titr
 Sample size (S) : 100 [ml]



C1: 44.429 [mg/L]

A1: 4.4429 [ml] -320 [mV]

Pi : -443 [mV]
 Start : 0 [ml] -443 [mV]
 End : 6.2 [ml] -320 [mV] Time: 3' 25"

Run File No.: 0 Quick Mode

Titration File No.: 24 Service water test (calcium hardness)

Mode : CROSS-B End1 End1 Width: -500 [mV] ± 500 [mV]

Detect : mV1

BRT No. : 1

Reagent : 19

WTint : 0 [sec]

Vup : 100 [μl]

Vlow : 100 [μl]

dE : 3 [mV]

dT : 3 [sec]

DL : 5 [mV/ml]

DetCnt : 10

Vmax : 50 [ml] C1: A1*(1000/S)*1

Vover : 1 [ml] [mg/L]

Reag : 0.01M-EDTA E : 1 M : 0.01 [Mol/l]

F : 1

Buret Injection Speed: 500 [ul/sec]