

Sheet No.

**GT200-FO015E** Food & Beverage

# Determination of total hardness of natural mineral water

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Method : Chelatometry, Photometric detection  
Apparatus : Automatic Titrator model GT-200 (GT0EF)  
Electrodes: Photometric Detector model GT-LDII (GTLD2C)  
Interference filter, 620nm (GTF620)  
Titration mode : CROSS-B, Detection: mV  
Related standard : Standard Methods of the Examination of Water, Japan: Hardness and Total hardness

\*This application sheet is provided as reference, and does not assure the measurement results. Please consider analysis environment, external factors and sample nature for optimal conditions before the measurement.

## Outline

Hardness mentions calcium and/or magnesium contents in water. Drinking water is divided into two classes, soft water having lower hardness (lower than 100mg/L) and hard water having higher hardness (higher than 301mg/L). Japanese people typically prefer soft water taste. Hardness of natural mineral water is determined by chelatometric titration with photometric detector.

## Reagents

[ Titrant ]

■0.01mol/L-EDTA solution (Reagent research grade)

[ Reagents ]

■Ammonia buffer solution (pH10): Take 67.5g of ammonium chloride into 1L beaker. Add 300ml of pure water. After ammonium chloride is dissolved into the water, add 570ml of ammonia water. Make 1L solution with adding pure water.

[ Indicator ]

■Eriochrome blackT (EBT): Make 100ml solution with dissolving 0.5g of Eriochrome blackT and 4.5g of hydroxylamine hydrochloride into ethanol. Keep the solution in a brown bottle at a cool and dark place. (expiry: 1 month)

## Analytical Procedure

- (1) Take 100ml of the sample into a 200ml beaker by a measuring cylinder.
- (2) Add 2ml of Ammonia buffer solution (pH10) by a pipette.
- (3) Add 0.5ml of Eriochrome blackT indicator by a micro pipette.
- (4) Titrate by 0.01mol/L-EDTA solution (color change: from purplish blue to blue)

[Calculation]

**Total hardness (  $\text{CaCO}_3$  mg/L ) =  $A1 \times ( 1000 / S ) \times 1$**

A1 : Titration volume of 0.01mol/L EDTA solution from the test

S : Sample size (ml)

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- Temperature of the sample must be room temperature.
- Make sure to confirm labels and safety data sheets of reagents and gases used for the measurement and handle them with enough care.
- Wear protective equipment (eye protector, gloves and others) when handling reagents.

**Measurement Results**

	Sample size (ml)	Titration volume (ml)	Results (mg/L)
1	100ml	1.1842	11.8
2		1.1703	11.7
3		1.1928	11.9

Nos. of data (n) 3  
Average 11.8  
Standard deviation (SD) 0.1135  
Relative S.D. (RSD%) 0.9602

Hardness of natural mineral water was tested by GT-200.

Result was 11.8mg/L.

Repeatability was good with relative standard deviation (RSD%) was 0.96%.

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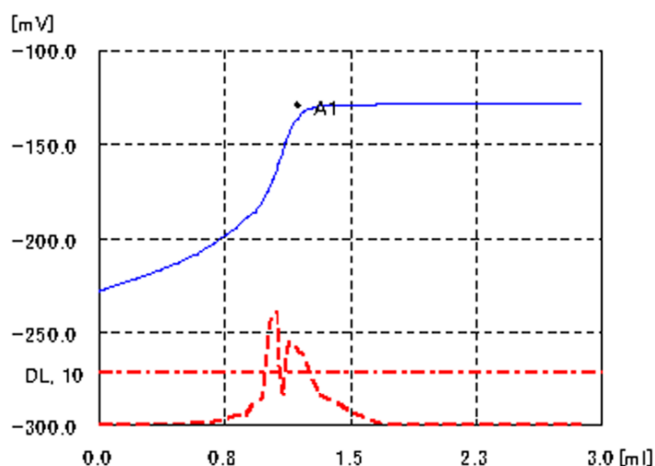
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ID No. : 5 GT No.1

User : GT-200

Measurement : 2013/04/04 17:04  
 Sample name : Natural mineral water

Type : Sample Titr  
 Sample size(S) : 100 [ml]



C1 : 11.842 [mg/L]

A1 : 1.1842 [ml] -129 [mV]

Initial potential(Pi) : -228 [mV]

Start (Start) : 0 [ml] -228 [mV]

End (End) : 2.874 [ml] -128 [mV]

Measurement time(Time) : 1'55"

Run file No. : 7 Hardness of Natural mineral water

Titration file No. : 10 Hardness of Natural mineral water

Mode : CROSS-B End1, End1 Width : -200 [mV]  $\pm$  500 [mV]

Detect : mV1

BRT No. : 1

Reagent : 19

WTint : 10 [sec]

Vup : 200 [ $\mu$ l]Vlow : 10 [ $\mu$ l]

dE : 5 [mV]

dT : 3 [sec]

DL : 10 [mV/ml]

DetCnt : 10

C1 :  $A1 \cdot (1000/S) \cdot 1$ 

Vmax : 20 [ml]

Vover : 1 [ml] [mg/L]

Reagent (Reag) : 0.01M-EDTA

Equivalent (E) : 1

Molarity(M) : 0.01 [Mol/l]

Factor (f) : 1

BuretIn Jection Speed : 500 [ $\mu$ l/sec]