

## Determination of total alkalinity of tap water (T alkalinity/M alkalinity)

Sheet № : **GT200-WA029E**

Water and sewer

Method **Acid-base titration**Automatic Titrator model GT-200  
(GT0EF)Related  
standardStandard Methods for the  
Examination of Water, Japan  
Water Works Association:Electrodes:  
Apparatus Reference electrode, double junction  
(GTRE10B) —Alkalinity, Total alkalinity of  
tap water

\*Inner solution: 1mol/l Potassium chloride

\*Outer solution: 1mol/l Potassium nitrate

Glass electrode (GTPH1B)

Titration  
mode**SET-P, Detection: pH**

\*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

Alkalinity is determined by titrating a water sample with a strong acid (such as chlorine and sulfuric acid) and expressed by the calcium carbonate content (mg/L) corresponding to the amount of acid consumed until the pH value reaches the prescribed value. Alkalinity measured with the end point of pH4.8 is called total alkalinity (or T alkalinity or M alkalinity).

### Reagents

[Titrant] ■ 0.01mol/L-sulfuric acid solution (Volumetric analysis grade)

[Reagents] ■ pH standard solution (pH 4, 7 and 9)

### Analytical procedure

- (1) Perform pH calibration using pH standard solution before measurement.
- (2) Collect 100ml tap water using a whole pipette and add it into a 200ml beaker.
- (3) Titrate with 0.01mol/L-sulfuric acid solution. **(MODE:SET-P, END1: pH4.8)**

[Calculation]

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

- A1 : Titration volume of 0.01mol/L-sulfuric acid solution until the end point (pH4.8) (ml)  
1000 : Unit conversion factor (ml/L)  
S : Sample volume (ml)  
1 : Calcium carbonate content equivalent to 1ml of 0.01mol/L-sulfuric acid solution (mg)

### Other requirement

- Set tap water at 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

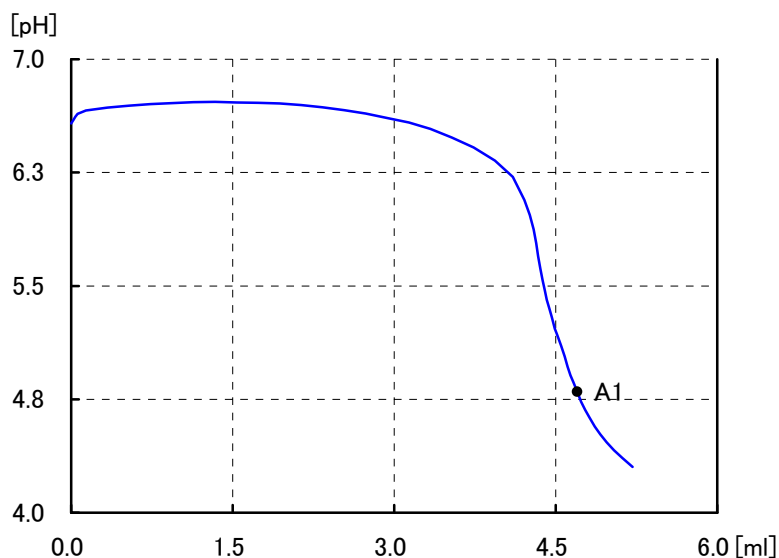
	Sample size (g)	Titration volume (ml)	Results (CaCO <sub>3</sub> mg/l)
1	100	4.6900	47.0
2		4.7388	47.4
3		4.7563	47.6

Nos. of data	(n)	3
Average		47.3
Standard deviation	(SD)	0.29
Relative standard deviation	(RSD%)	0.62

Total alkalinity of tap water was measured using GT-200. The average of three measurements was 47.3mg/L and the relative standard deviation (RSD %) was 0.62%. GT-200 can measure total alkalinity of tap water with good repeatability.

Measurement : 2014/12/03 15:01  
 Sample name : Tap water

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



C1 : 46.99 [mg/L]

A1 : 4.699 [ml]      4.8 [pH]

Initial potential (Pi)	6.575	[pH]		
Start :	0	[ml]	6.575	[pH]
End :	5.212	[ml]	4.302	[pH]
				Time : 2'48"

Run file No. : 19 Total alkalinity of tap water

Titration file No. : 53 Total alkalinity of tap water \*Run file and Titration file parameters are set for each analysis item

Mode : SET-P      End1 : 4.8 [pH]

Detect : pH

BRT No. : 1

Reagent : 1

WTint : 10 [sec]

Vup : 200 [μl]

Vlow : 20 [μl]

dE : 0.1 [pH]

dT : 3 [sec]

Vmax : 50 [ml]

Vover : 0.5 [ml]      C1 : A1\*(1000/S)\*1

[mg/L]

Reagent name (Reag) : 0.01M H2SO4      Equivalent (E) : 2      Molarity(M) : 0.01 [Mol/l]

Factor (f) : 1

Buret Injection Speed : 500 [ul/sec]