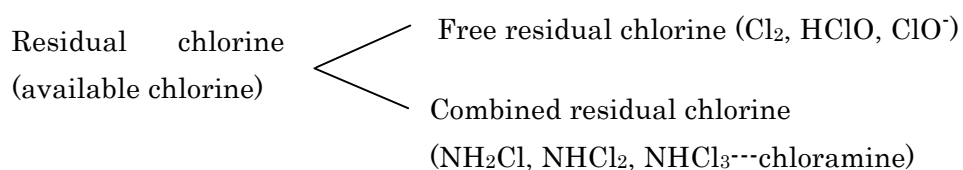


AQUACOUNTER Application Sheet	COM series	DATA No. D4	1st edition
Environmental	Measurement of residual chlorine in running water		

1. Measurement outline

Residual chlorine exists in running water, which is produced by chlorinating river water or lake water. Residual chlorine is also called available chlorine, and it comprises of free residual chlorine and combined residual chlorine.

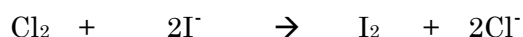


The following methods for measuring residual chlorine are adopted in the test method for drinking water:

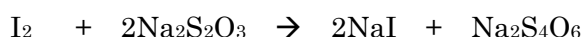
- DPD method (diethyl-P-phenylenediamine) Colorimetry
- OT method (O-tolidine method) Colorimetry
- DPD method (diethyl-P-phenylenediamine titration method) Titration method
- Current titration method
 (titration method with phenyl arseno oxide titrant) Titration method
- Iodine titration method Titration method

This section introduces the example in which the residual chlorine in running water was measured using iodine titration method.

Residual chlorine oxidizes potassium iodide and disengages iodine in acidic solution.



Potentiometric titration is conducted on generated iodine using sodium thiosulfate titrant.



2. Reagents and Electrodes

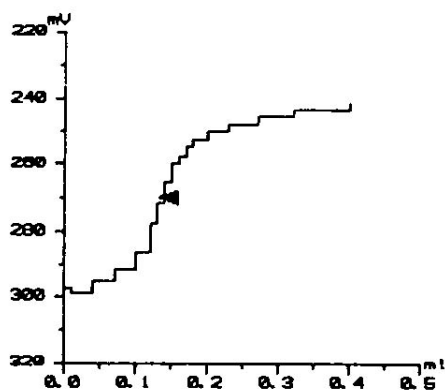
(1) Reagents	Titrant	0.01mol/L sodium thiosulfate titrant
	Loading buffer	sulfuric acid (1 + 5)
(2) Electrodes	Indicator electrode	Platinum electrode PT-301 (P/N D231244-A)
	Reference electrode	*Reference electrode RE-201 (4M potassium chloride inner solution used) *standard accessory

3. Measurement conditions example (for COM-1600S)

Master File No.1	
Condition file: 1	
Parameters for Condition file 1	
Method	Auto
Amp No.	2
Buret No.	1
Meas Unit	mV
S Timer	0 sec
CP	0 mL
DP	0 mL
End Sens	300
Over mL	0.20 mL
Max Vol	100 mL
Mode No.	5
Unit	ppm
Formula	$(D-B) \times K \times F \times M \times 1000 / S$
Blank	* BLANK result value
Molarity	0.01
Factor	Titer of the titrant
K	35.45 (as Cl^-)

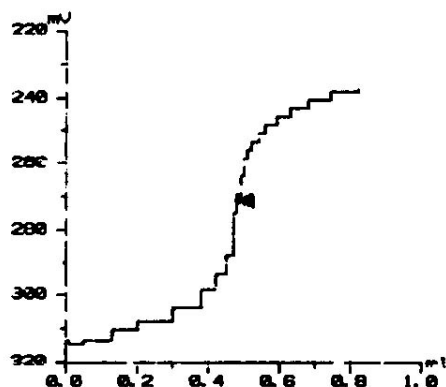
Mode No.5	
Pre Int	0 sec
Del K	5
Del Sens	0 mV
Int Time	3 sec
Int Sens	3 mV
Brst Speed	2
Pulse	8

4. Measurement example



Measurement results on residual chlorine in clean water (1)

Sample No.	Sample volume (mL)	Titration value (mL)	Concentration (ppm)
1	250	0.478	0.678
2	250	0.477	0.676
3	250	0.474	0.672
4	250	0.477	0.676
5	250	0.484	0.686
Avg.			0.678 ppm
Std. Dev.			0.0052 ppm
C.V.			0.77 %

Measurement results on residual chlorine in clean water (2)

Sample No.	Sample volume (mL)	Titration value (mL)	Concentration (ppm)
1	250	0.133	0.144
2	250	0.129	0.119
3	250	0.115	0.143
4	250	0.132	0.142
5	250	0.132	
Avg.			0.138 ppm
Std. Dev.			0.011 ppm
C. V.			7.97 %

5. Note

1) Measurement precision

In this section, potentiometric titration method was used for end point detection to measure the sample of approximately 0.6ppm with sample collection volume of 250mL (500mL for the test method for drinking water) at standard deviation of 0.011ppm and coefficient of variation approximately 8%. Based on the results of this measurement, it is assumed that the measurement limit for this method is 0.1ppm.

2) High sensitivity measurement by iodine coulometric titration

Iodine coulometric titration method is another method in which residual chlorine can be measured at the precision of 0.01ppm. This method measures residual chlorine by coulometric titration of iodine ion with back titration.

3) Separate measurement of free chlorine and combined chlorine

In iodine titration method, the total level of free chlorine and combined chlorine is measured and separate measurement on free chlorine and combined chlorine is impossible. Therefore, DPD titration method or current titration method can be used for measurement with this purpose.

Key words

Residual chlorine, oxidation-reduction titration, iodine titration method

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