

AQUACOUNTER Application Sheet	COM series	DATA No. H6	1st edition
Paper and Pulp		Quantification of sodium chloride in sodium hypochlorite	

1. Measurement outline

The manufacture method for sodium hypochlorite comprises of chlorine gas absorption into sodium hydroxide. There are residual alkali content (NaOH and Na₂CO₃) as well as sodium chloride formed by decomposition of hypochlorous acid in the manufactured sodium hypochlorite. Residual alkali content is quantified by neutralization titration. Meanwhile, sodium chloride is titrated by precipitation titration. This section introduces an example in which sodium chloride contained in sodium hypochlorite was measured using potentiometric titration method.

When sodium chloride in sodium hypochlorite is quantified by precipitation titration, the total amount of sodium hypochlorite and sodium chloride is titrated. Therefore, sodium chloride is quantified by first titrating the entire chlorine content (NaClO + NaCl) and then titrating sodium hypochlorite by another method to subtract the measurement result for the latter from the result for the former.

(1) Quantification of total sodium chloride

- ① 0.5mL of sample is collected to add 5mL 3% hydrogen peroxide and decompose sodium hypochlorite into sodium chloride.



- ② It is titrated and acidified until pH is 2 – 3 with 0.05mol/L sulfuric acid titrant or 0.1mol/L nitric acid titrant.
- ③ It is titrated with 0.1mol/L silver nitrate titrant.



(2) Quantification of available chlorine

- ① 2mL of sample is collected in a 100mL beaker.
- ② 20mL 10% potassium iodide solution and 20mL 2mol/L acetic acid are added. Sodium hypochlorite oxidizes potassium iodide and forms iodine.



- ③ It is titrated with 0.1mol/L sodium thiosulfate titrant.



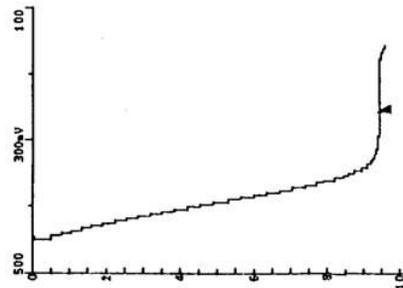
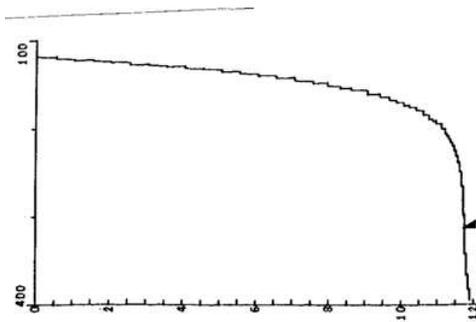
2. Reagents and Electrodes

	For titration of total sodium chloride		For titration of available chlorine
(1) Reagents Titrant	0.05mol/L sulfuric acid (or 0.1mol/L nitric acid)	0.1mol/L silver nitrate	0.1mol/L sodium thiosulfate
Loading buffer	5mL: 3% hydrogen peroxide solution	---	20mL: 10% potassium iodide solution 20mL: 2mol/L acetic acid solution
(2) Electrodes Indicator electrode	Glass electrode GE-101B *standard accessory	Silver electrode AG-311 (P/N E231245-A)	Platinum electrode PT-301 (P/N D231244-A)
Reference electrode	Reference electrode RE-201 *standard accessory	Silver reference electrode MS-231 (P/N D231243-A)	RE-201

3. Measurement conditions example (for COM-1600S + 3 units of Buret B-2000-20)

Master file 1 Condition file 1 + 2				Master file 2 Condition file 1	
Parameters for condition file 1 (For pH adjustment)		Parameters for condition file 2 (For total sodium chloride)		Parameters for condition file 1 (For available chloride)	
Method	SET	Method	AUTO	Method	AUTO
Amp No.	1	Amp No.	2	Amp No.	2
Buret No.	1	Buret No.	2	Buret No.	2
Meas Unit	pH	Meas Unit	mV	Meas Unit	mV
S Timer	30 sec	S Timer	5 sec	S Timer	5 sec
CP pH	8.00 pH	CP mL	0 mL	CP mL	0 mL
Direction	DOWN	Direction	N/A	Direction	N/A
DP pH	0	DP mL	0 mL	DP mL	0 mL
End Point	2.0 pH	End Sens	100	End Sens	500
Over mL	0	Over mL	0 mL	Over mL	0 mL
Max. Vol	30 mL	Max. Vol.	40 mL	Max. Vol.	20 mL
Unit	-	Unit	%	Unit	%
Formula	-	Formula	$(D-B) \times K \times F \times M / (S \times 10)$	Formula	$(D-B) \times K \times F \times M / (S \times 10)$
Blank	0	Blank	0	Blank	0
Molarity	0.1	Molarity	0.1	Molarity	0.1
Factor	Titer of the titrant	Factor	Titer of the titrant	Factor	Titer of the titrant
K	0	K	58.44	K	35.46
Mode. No	5	Mode. No	5	Mode. No	3
Pre Int	0 sec	Pre Int	0 sec	Pre Int	0 sec
Del K	5	Del K	5	Del K	2
Del Sens	0 mV	Del Sens	0 mV	Del Sens	0 mV
Int Time	3 sec	Int Time	3 sec	Int Time	1 sec
Int Sens	3 mV	Int Sens	3 mV	Int Sens	3 mV
Brt Speed	2	Brt Speed	2	Brt Speed	2
Pulse	40	Pulse	40	Pulse	40

4. Measurement example



Measurement results on total NaCl

Sample No.	Sample volume (mL)	Titration value (mL)	Concentration (%)
1	0.5	11.717	26.360
2	0.5	11.849	26.658
3	0.5	11.845	26.649
Avg.			26.56 %
Std. Dev.			0.17 %
C.V.			0.64 %

Measurement results on available chlorine

Sample No.	Sample volume (mL)	Titration value (mL)	Concentration (%)
1	2	9.4049	16.633
2	2	9.4052	16.633
3	2	9.4000	16.624
Avg.			16.63 %
Std. Dev.			0.0052 %
C.V.			0.031 %

5. Outline

Precautions in measurement

It is necessary that excessive hydrogen peroxide be added against sodium hypochlorite in order to decompose the sodium hypochlorite contained in the sample. If sodium hypochlorite remains, it will result in titration value being added to the second step of the titration curve.

Key words

Quantification of sodium chloride in sodium hypochlorite, precipitation titration, hydrogen peroxide, oxidation-reduction titration

Hitachi High-Technologies Corporation

Head Office 1-24-14, Nishishinbashi, Minato-Ku, Tokyo 105-8717, Japan

Tel : 81-3-3504-7239 Fax : 81-3-3835-7302

<http://www.hitachi-hitech.com>

Hiranuma Sangyo Co.,Ltd.

1739, Motoyoshidacho, Mito-City, Ibaraki 310-0836, Japan

Tel : 81-29-247-6411 Fax : 81-29-247-6942

<http://www.hiranuma.com>