AQUACOUNTER Application Sheet	COM series	DATA No. H4	1st edition

Paper and Pulp — Quantification of available chlorine in sodium hypochlorite

1. Measurement outline

Sodium hypochlorite has strong oxidizability and disinfection power, and is used for bleaching and disinfection of clean water. Though sodium hypochlorite is relatively stable in alkaline range, it is unstable in acidic range and turns into hypochlorous acid (HClO). It oxidizes water in strong acid range and forms chlorine (Cl_2).

Since sodium hypochlorite gradually discomposes and forms sodium chloride, its available chlorine concentration needs to be measured regularly. This section introduces a measurement example of quantification of available chlorine using potentiometric titration method.

(1) Approximately 0.5g of sample is weighed precisely into a 100mL beaker.

(2) 20mL 20% potassium iodide solution and 10mL acetic acid are added. Chlorine oxidizes potassium iodide and forms iodine.

$$Cl_2 + KI \rightarrow I_2 + KCl \quad \text{----------} \quad (1)$$

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

$$I_2 + 2Na_2S_2O_3 \rightarrow 2NaI + Na_2S_4O_6 \quad \text{----------} \quad (2)$$

2. Reagents and Electrodes

(1) Reagents	Titrant	0.1mol/L sodium thiosulfate titrant
	Loading buffer	20mL 20% potassium iodide 10mL acetic acid
(2) Electrodes *standard accessories	Indicator electrode	Platinum electrode PT-301 (D231244-A) to IE jack
	Reference electrode	*Reference electrode RE-201 to RE jack

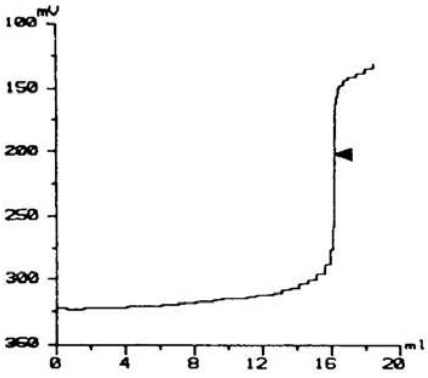
3. Measurement conditions example (for COM-1600S)

Master File No.1 Condition file: 1	
Method	AUTO
Amp No.	2
Buret No.	1
Meas Unit	mV
S-Timer	10 sec
CP	0 mL
DP	0 mL
End Sens	200
Over mL	2 mL
Max Vol	40 mL
Mode No.	7
Unit	%
Blank	BLANK result value
Factor	Titer of the titrant
Molarity	0.1
K	35.45
Formula	(D-B)×K×F×M/(S×10)

Mode No.7	
Pre Int	0 sec
Del K	9
Del Sens	0 mV
Int Time	5 sec
Int Sens	3 mV
Brt Speed	2
Pulse	40

4. Measurement example

Measurement results on available chlorine in sodium hypochlorite



Sample No.	Sample volume (g)	Titration value (mL)	Concentration (%)
1	0.5167	16.238	11.138
2	0.5136	16.152	11.146
3	0.4902	15.404	11.137
4	0.5172	16.281	11.157
	Avg.		11.145 %
	Std. Dev.		0.009 %
	C.V.		0.081 %

5. Outline

Precautions on measurement

(1) It is important that the sample be weighed promptly since the chlorine content in the sampleis unstable.

(2) It is important that the iodine formed in reaction with potassium iodide be titrated immediately since it is easily volatilize. Volatilization of iodine depends on the concentration of potassium iodide added, and thus it must be added sufficiently.

Key words

Quantification of available chlorine in sodium hypochlorite, 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