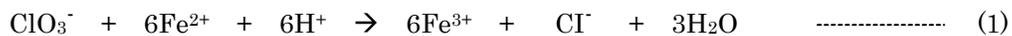


AQUACOUNTER Application Sheet	COM series	DATA No. H7	1st edition
<b>Paper and Pulp</b>		<b>Measurement of sodium chlorate (NaClO<sub>3</sub>) purity</b>	

**1. Measurement outline**

The measurement method for purity of sodium chlorate is stipulated in JISK8208 as a quantification method. Sodium chlorate is formed by bringing chlorine gas to react with sodium hydroxide. Sodium chlorate is used as a raw material for various products as a strong oxidant. In quantification of sodium chlorate, it is first heated in a solution acidified with sulfuric acid to react with ferrous sulfate. The excessive ferrous sulfate is then titrated with potassium permanganate titrant. This section introduces an example in which sodium chlorate was measured using potentiometric titration method.

- (1) 5mL of sample is weighed precisely and added into a 500mL volumetric flask to be diluted with purified water to the volume of 500mL.
- (2) 20mL 5% ferrous sulfate solution is added a 100mL beaker precisely, and 5mL purified water is added to boil on a hot plate for 5 minutes.



- (3) Approximately 40mL purified water is added and the remaining ferrous sulfate solution is titrated with 0.02mol/L potassium permanganate titrant.



**2. Reagents and Electrodes**

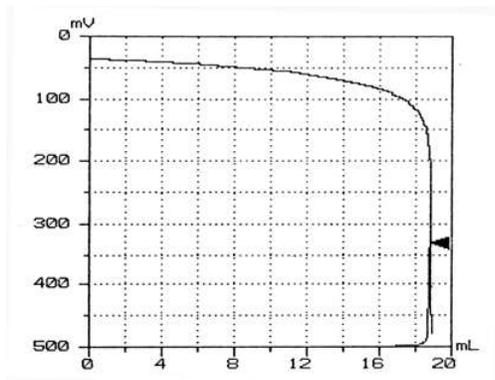
(1) Reagents	Titrant	0.02mol/L potassium permanganate titrant
	Loading buffer	5% ferrous sulfate solution : Prepared by using sulfuric acid (1+9)
(2) Electrodes	Indicator electrode	Platinum electrode PT-301 (P/N D231244-A)
	Reference electrode	*Reference electrode RE-201      *standard accessory

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

<b>Master File No.1</b>	
<b>Condition file: 1</b>	
Method	AUTO
Amp No.	2
Buret No.	1
Meas Unit	mV
S-Timer	10 sec
CP	0 mL
DP	0 mL
End Sens	500
Over mL	0 mL
Max Vol	40 mL
Mode No.	5
Unit	%
Blank	Blank result value
Factor	Titer of the titrant
Molarity	0.1
K	17.74
Formula	$(D-B) \times K \times F \times M \times 1000 / S$

<b>Mode No.5</b>	
Pre Int	0 sec
Del K	5
Del Sens	0 mV
Int Time	3 sec
Int Sens	3 mV
Brst Speed	2
Pulse	40

**4. Measurement example**



**Measurement results on sodium chlorate**

Sample No.	Sample volume (g)	Titration value (mL)	Concentration (%)
<b>Blank</b>		35.318	<b>Avg.</b>
<b>Blank</b>		35.321	35.3195
1	6.8096	18.813	43.0311
2	6.8096	18.812	43.0337
3	6.8096	18.833	42.9789
<b>Avg.</b>			<b>43.01 %</b>
<b>Std. Dev.</b>			<b>0.03 %</b>
<b>C.V.</b>			<b>0.07 %</b>

## 5. Outline

### Precautions in measurement

The reaction between the oxidant sodium chlorate and potassium permanganate is slow, and it cannot be titrated directly with potassium permanganate. In this section, sodium chlorate was titrated by back titration on the remaining ferrous ion with potassium permanganate after reacting sodium chlorate and ferrous ion. Since the reaction speed between sodium chlorate and ferrous ion is small, reaction is facilitated by heating. However, caution is required that ferrous ion is oxidized if it is heated too long. In addition, this measurement applies back titration and precision is required for addition of 5% ferrous sulfate solution.

### Key words

Measurement of purity in sodium chlorate, oxidation-reduction titration, back 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>