AQUACOUNTER Application Sheet	COM series	DATA No. G7	1st edition

Metal — Quantification of manganese ion (Mn^{2+})

1. Measurement outline

Manganese ion is quantified by chelate titration. Though Mn (II) – EDTA chelate stability constant is relatively large (13.81), the pH range it restricted to pH 7 – 11.

Since Mn^{2+} is oxidized by air in alkaline solution, it is titrated by adding ascorbic acid or hydroxylamine. This section introduces an example in which it was titrated under alkaline conditions with ammonia (pH10).

$$Mn^{2+} + Na_2EDTA \rightarrow MnEDTA + 2Na^{+}$$

2. Reagents and Electrodes

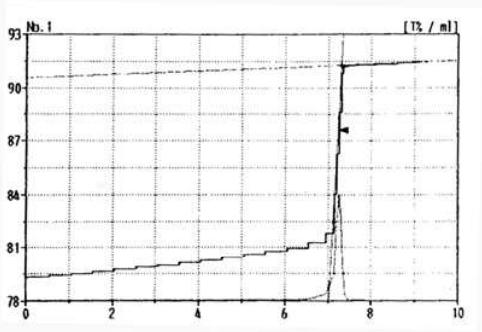
(1) Reagents	Titrant	0.01mol/L EDTA titrant
	Additives	0.1g ascorbic acid
	Buffer	(1:1) ammonia water is added to adjust to pH10.
	Indicator	TPC(3,3-bis[N,N-di(carboxymethyl)aminomethyl]thymolphthalein) diluted to 1/100 with potassium nitrate (blue → no color)
(2) Electrodes	Photometric probe with 650 nm filter	

3. Measurement conditions example (for COM-1600M w/ Photometric unit)

Master File No.1 Condition file: 1	
Method	B Cross
Amp No.	2
Buret No.	1
Meas Unit	T%
S-Timer	10 sec
CP	0 mL
DP	0 mL
End Sens	500
Over mL	1.5 mL
Max Vol	20 mL
Mode No.	4
Unit	ppm
Blank	0
Factor	Titer of the titrant
Molarity	0.01
K	54.93805
Formula	(D-B)×K×F×M×1000 /S

Mode No.4	
Pre Int	0 sec
Del K	9
Del Sens	0 mV
Int Time	3 sec
Int Sens	3 mV
Brt Speed	2
Pulse	40

4. Measurement example



Measurement results on Mn^{2+}

Sample No.	Sample volume (mL)	Titration value (mL)	Concentration (ppm)
1	20	7.306	200.09
2	20	7.307	200.72
	Avg.		200.70 ppm

5. Outline

Mn^{2+} forms precipitate of $Mn(OH)_2$ in alkaline condition. To titrate under alkaline condition, it is titrated by adding excessive ammonium salt or by adding adjuvant complexing agent (tartrate, triethanolamine, etc.). Caution is required as to interference by coexisting ions since many metal ions start interfering when it is titrated near pH9 – 10.

Key words

Chelate titration, manganese ion, TPC indicator (thymolphthalein complexion)

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