AQUACOUNTER Application Sheet	COM series	DATA No. G4	1st edition
Metal	Quantification of Ni^{2+} in mixed solution of Ni^{2+} and Cu^{2+}		

1. Measurement outline

Ni^{2+} is quantified in sulfuric acid solution containing Ni^{2+} and Cu^{2+} in nearly equivalent concentrations by chelate titration. Since the EDTA chelate stability constants of Ni^{2+} and Cu^{2+} are nearly identical in the entire pH range, it is difficult to fractionate these components by pH adjustment. As a method for masking Cu^{2+}, a method in which Cu^{2+} is reduced to Cu^{+} with sodium thiosulfate in acidic range is used.

This section introduces an example of photometric titration with EDTA titrant using PAN indicator (red purple → yellow) by adjusting the sample solution to approximately pH4 – 5 and adding excessive sodium thiosulfate against Cu^{2+}.

$$Cu^{2+} + e^{-} \rightarrow Cu^{+}$$

$$Ni^{2+} + Na_2EDTA \rightarrow NiEDTA + 2Na^{+}$$

2. Reagents and Electrodes

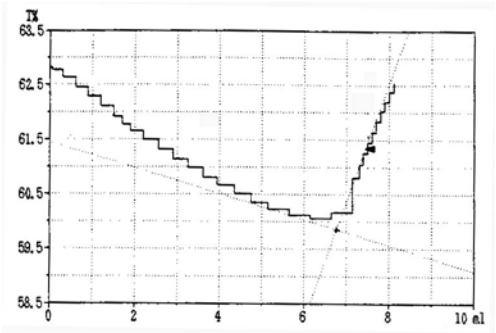
(1) Reagents	Titrant	0.01mol/L EDTA titrant
	Masking reagent	1g sodium thiosulfate
	Buffer	10mL acetic acid-sodium acetate buffer (pH4 – 5)
	Indicator	0.1mL PAN (1-pyridylazo-2-naphthol) indicator (2% ethanol solution)
(2) Electrodes	Photometric probe with 530 nm filter	

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

Master File No.1 Condition file: 1	
Method	F Cross
Amp No.	2
Buret No.	1
Meas Unit	T%
S-Timer	0 sec
CP	0 mL
DP	1 mL (for Ni^{2+}) / 0 mL (for Cu^{2+})
End Sens	30 (for Ni^{2+}) / 300(for Cu^{2+})
Over mL	0 mL
Max Vol	20 mL (for Ni^{2+}) / 50 mL (for Cu^{2+})
Mode No.	5
Unit	g/L
Blank	0
Factor	Titer of the titrant
Molarity	0.01
K	58.71 (as Ni^{2+}) / 63.546 (as Cu^{2+})
Formula	(D-B)×K×F×M/S

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

4. Measurement example



Measurement results on nickel ion

Sample No.	Sample volume (mL)	Titration value (mL)	Concentration (g/L)
1	10	6.759	19.96
2	10	6.842	20.20
	Avg.		20.08 g/L

5. Outline

(1) About end point detection

The titration curve in this section did not deliver a clear curve. It is assumed that the color change for the indicator (red purple → yellow) is inhibited by the effect of coexisting Cu^{+}.

(2) About the indicator

It is possible to quantify easily by chelate titration with MX indicator (yellow → blue purple) under ammoniacal condition (pH10) when Ni^{2+} is quantified singly.

Key words

Chelate titration, nickel, fractionation titration, masking of copper ion

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