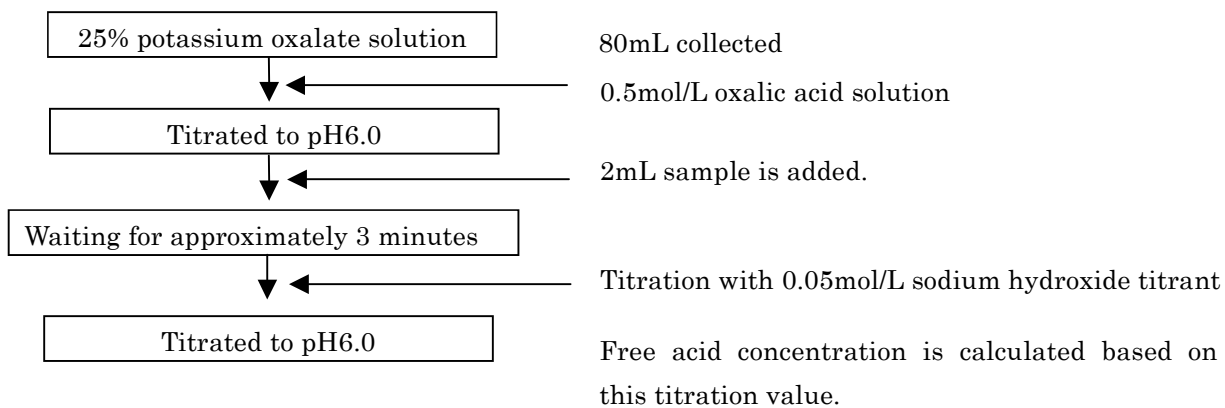


AQUACOUNTER Application Sheet	COM series	DATA No. F8	1st edition
Electronics	Quantification of free acid in lead frame treatment solution for IC		

1. Measurement outline

The etching treatment solution for IC lead frames comprises of free acids, whose main component is hydrochloric acid, and ferric chloride solution. While copper ion is gradually dissolved, the concentrations of hydrochloric acid and ferric chloride also change when etching treatment is conducted on lead frames.

Various methods have been contrived as the measurement method on free acids including ferric chloride. It is difficult to fractionate only free acids using neutralization titration since ferric chloride is also titrated. One method for masking ferric chloride is the use of adjuvant complexing agent. This section introduces an example in which it is quantified by neutralization titration after masking ferric chloride with potassium oxalate as the adjuvant complexing agent.



2. Reagents and Electrodes

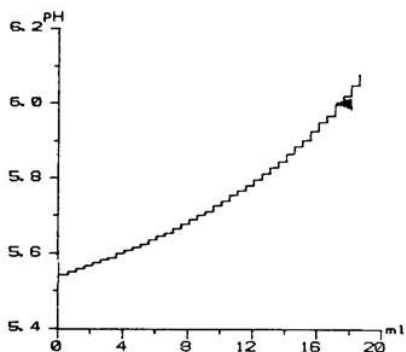
(1) Reagents	Titration	0.5mol/L oxalic acid titrant 0.05mol/L sodium hydroxide titrant
	Loading buffer	25% potassium oxalate solution
(2) Electrodes	Indicator electrode	*Glass electrode GE-101B to IE jack
	Reference electrode	*Reference electrode RE-201 to RE jack

*standard accessories

3. Measurement conditions example (for COM1600S + 1 unit of Buret B-2000-20)

Master file 1					
Condition file 1 + 2					
Parameters for condition file 1 (For the titration with oxalic acid)		Parameters for condition file 2 (For measurement)		Mode No. 5	
Method	DISP	Method	AUTO/SET	Pre Int	0 sec
Amp No.	1	Amp No.	1	Del K	5
Buret No.	2	Buret No.	1	Del Sens	0 mV
Meas Unit	pH	Meas Unit	pH	Int Time	3 sec
S Timer	0 sec	S Timer	240 sec	Int Sens	3 mV
Direction	DOWN	CP mL	0 mL	Brt Speed	2
End Point	6.00 pH	Direction	UP	Pulse	40
Max Vol.	20 mL	DP mL	1 mL		
		End Sens	500		
		End Point	6.00 pH		
		Over mL	1 mL		
		Max. Vol.	20 mL		
		Unit	%		
		Blank	0		
		Factor	Titer of the titrant		
		Molarity	0.05		
		K	36.46		
		L	1.476		
		Formula	$(D \cdot B) \times K \times F \times M / (S \times L \times 10)$		
		Mode No.	5		

4. Measurement example



Measurement results on hydrochloric acid and free acid

Sample No.	Sample volume (mL)	Titration value (mL)	Concentration (%)
1	2.5	17.220	0.8510
2	2.5	15.011	0.7461
3	2.5	13.985	0.6951
Avg			0.760 %
Std. Dev.			0.08 %
C.V.			10.4 %

5. Outline

(1) About masking method with complexing agent

In this method, measurement was taken according to the analysis method in Analytical Chemistry (Vol.17 1273 1968), results could not be obtained with good repeatability. Though its cause is not clear, it is assumed that it may depend on the amount of complexing agent added, complexing period and the concentration of ferric chloride.

(2) About other measurement methods

As a neutralization method other than this method, a neutralization method in which ferric chloride is changed to ferrous chloride by adding sodium thiosulfate has been proposed (patented).

Key words

Hydrochloric acid, ferric chloride, neutralization titration, potassium oxalate

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