AQUACOUNTER Application Sheet	COM series	DATA No. F6	1st edition
Electronics	Quantification of Na_2CO_3 and resist blending quantity in photosensitive dry film developer		

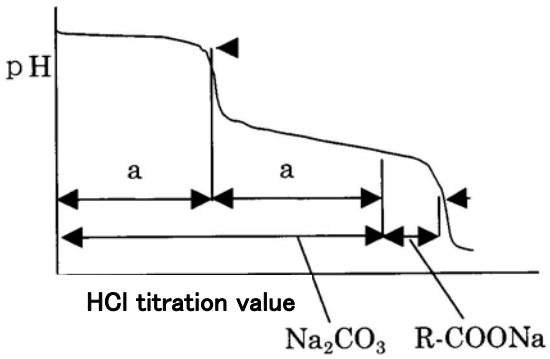
1. Measurement outline

In printed wiring board manufacture process, the photosensitive dry film after cohering to the printed wiring board and exposure to light is developed by soaking the dry film resist which has not been exposed to light in Na_2CO_3 solution to dissolve as carbonate salt.

$$2R\text{-}COOH + Na_2CO_3 \rightarrow 2R\text{-}COONa + CO_2 + H_2O$$

While the concentration of Na_2CO_3 in the developer decreases when development is repeated, the resist concentration increases. The rate of development failure can be reduced by controlling the Na_2CO_3 concentration and the quantity of resist blending. This section introduces an example in which the Na_2CO_3 concentration in developer was measured by neutralization titration and the resist blending quantity was measured by neutralization titration simultaneously by fractionation titration.

$$Na_2CO_3 + HCl \rightarrow NaHCO_3 + NaCl$$
$$NaHCO_3 + HCl \rightarrow NaCl + CO_2 + H_2O$$
$$R\text{-}COONa + HCl \rightarrow R\text{-}COOH + NaCl$$



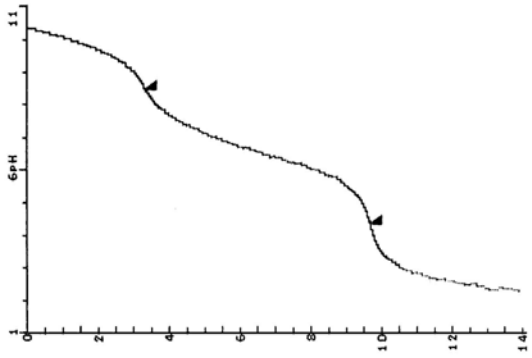
2. Reagents and Electrodes

(1) Reagents	Titrant	0.1mol/L HCl titrant
(2) Electrodes *standard accessories	Indicator electrode	*Glass electrode GE-101B 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 + 2**					
Parameters for Condition file 1 (For 1st End point)		**Parameters for Condition file 2** (For 2nd End point)		**Mode No.2**	
Method	AUTO	Method	AUTO	Pre Int	0 sec
Amp No.	1	Amp No.	1	Del K	5
Buret No.	1	Buret No.	1	Del Sens	0 mV
Meas Unit	pH	Meas Unit	pH	Int Time	1 sec
S-Timer	10 sec	S-Timer	0 sec	Int Sens	3 mV
CP	0 mL	CP	0 mL	Brt Speed	2
DP	0 mL	DP	0 mL	Pulse	40
End Sens	1000	End Sens	1000		
Over mL	0 mL	Over mL	0 mL		
Max. Vol.	20 mL	Max. Vol.	20 mL		
Mode No.	2	Mode No.	2		
Unit	%	Unit	%		
Formula	(D-VB)×K×F×M/S	Formula	VB×K×F×M/S		
Blank	0	Blank	0		
Molarity	0.1	Molarity	0.1		
Factor	Titer of the titrant	Factor	Titer of the titrant		
K	40	K	106		

4. Measurement example



Measurement results on Na_2CO_3 and resist blending quantity

Sample No.	Sample volume (mL)	Na_2CO_3		Resist blending quantity	
		Titration value (mL)	Concentration (%)	Titration value (mL)	Concentration (%)
1	5.0	8.28	0.887	1.42	0.0287
2	5.0	8.26	0.885	1.44	0.0291
	Avg.		0.886 %		0.0289 %
	Std. Dev.		0.0014 %		0.00028 %
	C.V.		0.16 %		0.17 %

5. Outline

About online-type automatic analyzers

An online-type analyzer (dry film developer analyzer DFT-1) has been commercialized for this analysis. It is optimal for automatic analysis of Na_2CO_3 developer in printed wiring board manufacture process. In addition, this system is equipped with concentration control function for developer solution and has a wide range of application. It is thus optimal for process control.

Key words

Dry film, neutralization titration, sodium carbonate, resist blending quantity

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