

AQUACOUNTER Application Sheet	COM series	DATA No. F5	1st edition
Electronics	Quantification of H₂O₂ in silicon wafer abrasive solution		

1. Measurement outline

Abrasive solutions containing SiO₂, H₂O₂, etc. are used as the silicon wafer abrasive solution which is used in semiconductor manufacture process. Abrasive effect is delivered with SiO₂ as a mechanical abrasive and H₂O₂ as a chemical abrasive. Since H₂O₂ in abrasive solution gradually decreases in concentration during the abrasion process, its concentration needs to be measured regularly to replenish H₂O₂ as necessary.

This section introduces an example in which H₂O₂ was quantified by oxidation-reduction titration using KMnO₄ titrant.



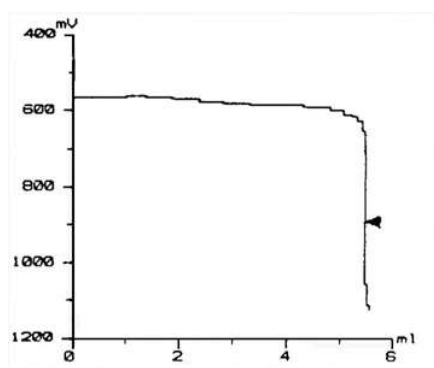
2. Reagents and Electrodes

(1) Reagents	Titrant	0.02mol/L KMnO ₄ titrant
	Loading buffer	5mL 1+5 H ₂ SO ₄ used
(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 + 1 unit of Buret B-2000-20)

Master file 1					
Condition file 1 + 2					
Parameters for condition file 1 (For addition of sulfuric acid)		Parameters for condition file 2 (For measurement)		Mode No. 20	
Method	DISP	Method	AUTO	Pre Int	5 sec
Buret No.	2	Amp No.	2	Del K	9
S-Timer	0 sec	Buret No.	1	Del Sens	0 mV
Disp. Vol.	5 mL	Meas Unit	mV	Int Time	3 sec
		S Timer	10 sec	Int Sens	2 mV
		CP mL	1 mL	Brt Speed	2
		DP mL	2 mL	Pulse	40
		End Sens	300		
		Over mL	0 mL		
		Max. Vol.	20 mL		
		Unit	%		
		Blank	0		
		Factor	Titer of the titrant		
		Molarity	0.02		
		K	17.007		
		Formula	$(D-B) \times K \times F \times M \times 5 / (S \times 10)$		
		Mode No.	20		

4. Measurement example



Measurement results on H₂O₂ in abrasive solution

Sample No.	Sample volume (mL)	Titration value (mL)	Concentration (%)
1	0.2	5.332	4.561
2	0.2	5.575	4.769
3	0.2	5.329	4.559
4	0.2	5.331	4.560
5	0.2	5.329	4.559
6	0.2	5.429	4.644
Avg.			4.609 %
Std. Dev.			0.086 %
C.V.			1.9 %

5. Outline

(1) About measurement by fully automatic titration system

In this section, the sample was measured by the fully automatic titration system and measurement results were obtained with high precision. The results of this measurement indicate possibility for online analysis, and application to RTR (process titrator) is possible.

(2) About measurement with hydrogen peroxide counter

Measurement with a hydrogen peroxide counter for H_2O_2 measurement, HP-35A (by iodine coulometric titration method), was tried, and the measurement results are shown below:

Measurement results on H_2O_2 with HP-35A

Sample No.	Concentration (%)
1	4.61
2	4.64
3	4.64
4	4.63
5	4.64
6	4.58
Avg.	4.62 %
Std. Dev.	0.02 %
C.V.	0.5%

Key words

Hydrogen peroxide, oxidation-reduction titration, abrasive solution, silicon wafer

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