

AQUACOUNTER Application Sheet	COM series	DATA No. B18	1st edition
Pharmaceuticals	Measurement of pKa for medical products		

1. Measurement outline

The pKa value for a medical product was measured using an automatic titration system.

0.2g of sample is weighed precisely and dissolved in 0.002mol/L hydrochloric acid. 100mL of sample solution is collected for Acid/Base titration with 0.1mol/L sodium hydroxide titrant.

The titration curve has two steps since hydrochloric acid is titrated first and then the weak acid of the sample is titrated. pKa value is calculated using the following formula based on the second titration curve.

$$pK_a = \text{pH value for } [1/2 \times \text{titration value (mL)}]$$

2. Reagents and Electrodes

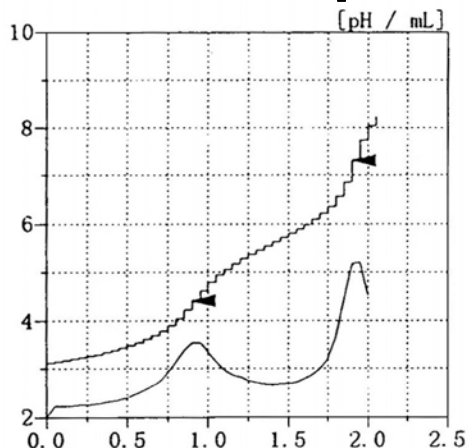
(1) Reagents	Titrant	0.1mol/L sodium hydroxide titrant
	Sample solution	100mL of 0.002mol/L hydrochloric acid
(2) Electrodes	Glass-reference-thermistor electrode GRT-601B (P/N D252356-1)	

3. Measurement conditions example (for COM-1600S)

Master File No.1	
Condition file: 1+1 (for 2-step end point detection)	
Method	AUTO
Amp No.	1
Buret No.	1
Meas Unit	pH
S-Timer	0 sec
CP	0 mL
DP	0 mL
Direction	N/A
End Sens	1000
Over mL	0 mL
Max Vol	20 mL
Mode No.	5
Unit	pKa
Blank	0
Factor	Titer of the titrant
Molarity	0.1
K	1
Formula	$1/2 \times D(\text{pH}) - \log(L/K)$

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

4. Measurement example



Measurement results

Sample No.	Titration value (mL)	pKa
1	1.060	5.599
2	1.002	5.628
3	1.049	5.618
Avg.		5.615
Std. Dev.		0.015
C.V.		0.262 %

5. Outline

Since this measurement example is a 2-step titration, fluctuation in the titration results for the first step has great effect on the measurement results of the second step. Thus it is important that the sample volume be set as large as possible and that the volume of hydrochloric acid used be reduced at the same time. While this experiment used the sample volume of 100mL, measurement error tended to grow with sample volumes 50mL and 25mL.

Key words

Medical product, pKa measurement, Acid/Base titration

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>