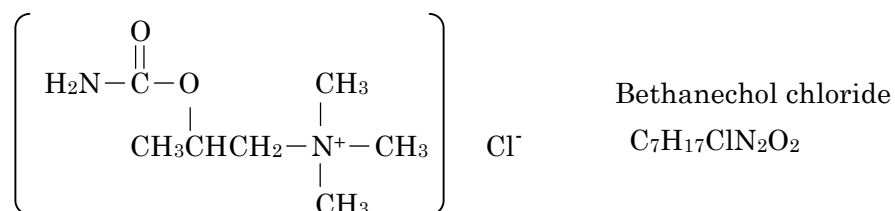


AQUACOUNTER Application Sheet	COM series	DATA No. B4	1st edition
Pharmaceuticals	Quantification of bethanechol chloride by perchloric acid titration		

1. Measurement outline

The method for quantifying bethanechol chloride which is used as an agonist for parasympathetic nervous system is stipulated in Japanese Pharmacopoeia (13th revision). In this method, the sample is dissolved in 2mL glacial acetic acid to be added with 40mL acetic anhydride for titration with 0.1mol/L perchloric acid titrant. Methylrosaniline chloride reagent is used as an indicator for end point detection, and titration end point is determined when the solution color changes from purple to green and to yellow-green. 1mol of bethanechol chloride and 1mol of perchloric acid react quantitatively. This section introduces an example of measurement using potentiometric titration for end point detection.



2. Reagents and Electrodes

(1) Reagents	Titrant	0.1mol/L perchloric acid titrant
	Solvent	Glacial acetic acid 2mL used for 1 measurement Acetic anhydride 40mL used for 1 measurement
(2) Electrodes	Indicator electrode	*Glass electrode GE-101B
	Reference electrode	*Reference electrode RE-201
	Note) Inner solution for reference electrode is saturated sodium perchlorate/acetate solution.	

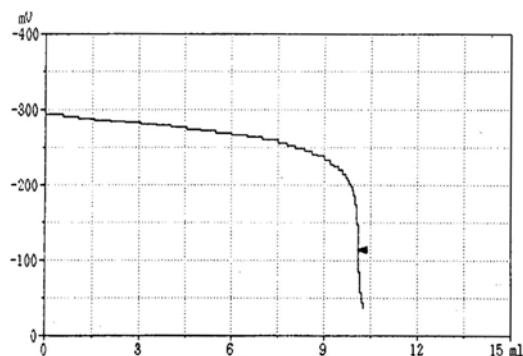
*Standard accessories

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

Master File No.1	
Condition file: 1	
Method	AUTO
Amp No.	1
Buret No.	1
Meas Unit	mV
S-Timer	0 sec
CP	0 mL
DP	0 mL
Direction	N/A
End Sens	500
Over mL	0 mL
Max Vol	20 mL
Mode No.	5
Unit	%
Blank	0
Factor	Titer of the titrant
Molarity	0.1
K	196.68
Formula	$(D-B) \times K \times F \times M / (S \times 10)$

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



Blank measurement results

Sample No.	Sample volume (g)	Titration value (mL)	Concentration (%)
1	0.2005	10.087	17.94
2	0.2002	10.076	17.95
3	0.2009	10.124	17.97
4	0.2002	10.057	17.92
5	0.2009	10.125	17.97
6	0.2007	10.090	17.93
Avg.			17.95 %
Std. Dev.			0.02 %
C.V.			0.12 %

5. Outline

(1) In this measurement, the content in the sample is measured accurately and it is necessary that measurement of sample weight, titer of titrant, blank value, etc. be conducted with due caution. It is especially necessary that the titer of the titrant (HClO_4) be measured regularly with potassium hydrogen phthalate. In addition, organic solvent (acetic acid) is used for titrant, and it must be noted that the change in volume in concurrence to temperature change (approximately 0.11% change at 1°C) is larger compared to normal solutions. It is important to try to measure at a stable temperature.

If the concentration of the titrant for titration varies from that of titer evaluation, it is possible to correct it by substituting titer correction formula into the concentration correction formula.

$$F = \frac{F_0}{1 + \alpha(t - t_0)}$$

F	:	Titer at sample titration (after correction)
F_0	:	Titer at titer evaluation
α	:	Volumetric expansion coefficient for titrant (acetic acid = 1.07×10^{-3})
t	:	Temperature for sample titration
t_0	:	Temperature for titer evaluation

(2) Method of preparing reference electrode

The reference electrode to be used in this measurement must be an electrode for nonaqueous titration. The following shows the method for preparing the reference electrode to be used for this measurement:

- Release the inner solution for reference electrode RE-201 and wash the inner surface well with acetic acid. Then prepare a solution saturated with sodium perchlorate (special class reagent) and inject it from the refill opening for the electrode. Since the electrode potential may not stabilize immediately, it is recommended that it is used after leaving it standing for 1 entire day.

Key words

Medical product, bethanechol chloride, Japanese Pharmacopoeia, perchloric acid titration, nonaqueous titration, sodium perchlorate saturated/acetic acid solution

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