

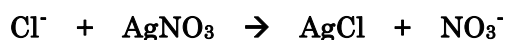
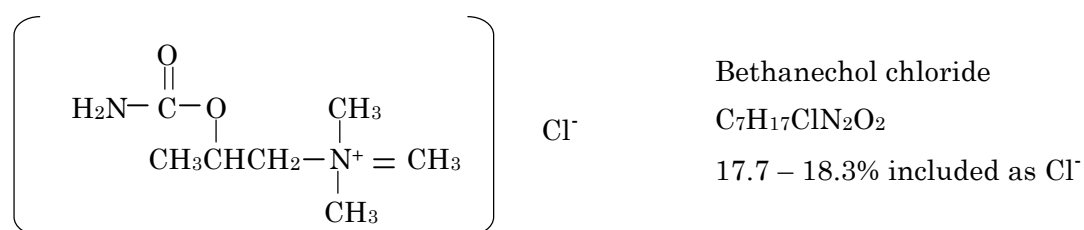
AQUACOUNTER Application Sheet	COM series	DATA No. B17	1st edition
Pharmaceuticals	Quantification of chlorine in bethanechol chloride		

1. Measurement outline

The method for quantifying chlorine in bethanechol chloride, which is a parasympathetic agent, is stipulated in Japanese Pharmacopoeia (13th revision). There are two methods for quantifying this medical product; the method for quantifying the amino group by perchlorate titration and the method for quantifying the chlorine by precipitation titration. In the latter method, the sample is dissolved in purified water to be added with a certain volume of silver nitrate solution, acetic acid and nitrobenzene to shake and mix for 2 – 3 minutes for reaction between chlorine and silver nitrate. Then back titration is conducted for excessive silver nitrate that remains in the solution with 0.1mol/L ammonium thiocyanate titrant (indicator: ferric ammonium sulfate).

This section introduces the method in which silver nitrate titrant is directly used for potentiometric titration with potential difference detection method as the end point detection method instead of the back titration method.

0.2g of sample is weighed precisely and dissolved in 50mL purified water for addition of 5mL acetic acid and potentiometric titration with silver nitrate titrant.



2. Reagents and Electrodes

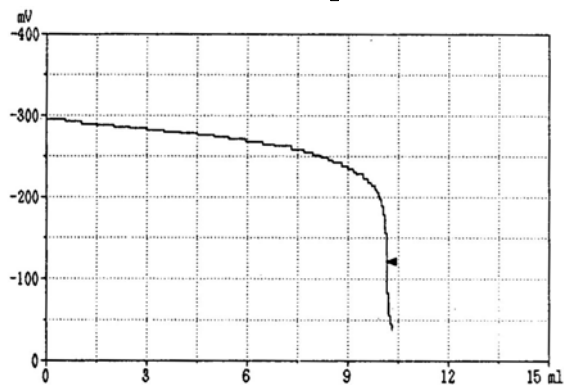
(1) Reagents	Titrant	0.1mol/L AgNO ₃ titrant
	Loading buffer	5mL glacial acetic acid for 1 measurement
(2) Electrodes	Indicator electrode	Silver indicator electrode AG-311 to IE jack (P/N E231245-A)
	Reference electrode	Silver reference electrode MS-231 to RE jack (P/N D231243-A)

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

Master File No.1	
Condition file: 1	
Method	AUTO
Amp No.	2
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	35.453
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
Brst Speed	2
Pulse	40

4. Measurement example



Measurement results

Sample No.	Sample volume (g)	Titration value (mL)	content (%)
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 experiment, the sample was titrated directly with silver nitrate titrant by using potential difference detection method for end point detection instead of back titration method, and measurement results were obtained with high precision. The features of this method include simple measurement operation compared to back titration and use of only one type of reagent. In general, potentiometric titration method is popularly used in quantification of halogen ions (Br^- , I^- , Cl^-), and one feature of this method is easy end point detection even in cases in which judgment of indicator inflection point is difficult due to coloring in sample, etc. It also has the feature to allow measurement with little individual error.
- (2) When conducting potentiometric titration on high-concentration halogen ion with silver nitrate in general, generation of silver halide precipitation is feared to adhere to indicator electrode, etc. and affect the titration curve and measurement precision. As one measure against this, “silver chloride precipitate cohesion prevention agent” can be added in advance to the titrated solution to reduce precipitation of silver chloride and prevent adherence to the indicator electrode as well as absorption of halogen ion into precipitation, thus improving the measurement precision.

Key words

Medical product, bethanechol chloride, precipitation titration, silver chloride precipitate cohesion prevention agent

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