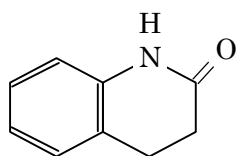


AQUACOUNTER Application Sheet	COM series	DATA No. B3	1st edition
Pharmaceuticals	Quantification of carteolol hydrochloride with perchloric acid titration		

## 1. Measurement outline

The method of quantifying carteolol hydrochloride which is used as an agonist for circular system and anti-glaucoma agent is stipulated in Japanese Pharmacopoeia (13th revision). In this method, the sample is heated and dissolved in glacial acetic acid and cooled. Acetic anhydride is then added for potentiometric titration with perchloric acid titrant. 1mol of carteolol hydrochloride and 1mol of perchloric acid react quantitatively.



Carteolol hydrochloride



## 2. Reagents and Electrodes

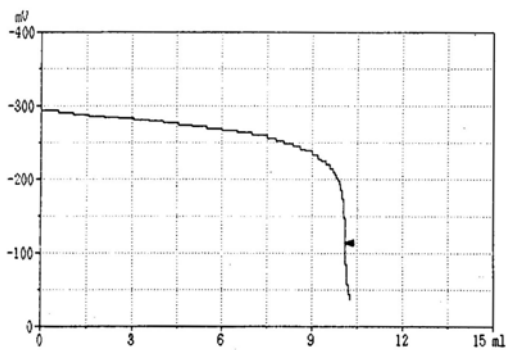
(1) Reagents	Titrant	0.1mol/L perchloric acid titrant
	Solvent	Glacial acetic acid 30mL used for 1 measurement Acetic anhydride 70mL used for 1 measurement
(2) Electrodes  *Standard accessories	Indicator electrode	*Glass electrode GE-101B
	Reference electrode	*Reference electrode RE-201
	<b>Note)</b> Inner solution for reference electrode is saturated sodium perchlorate/acetate solution.	

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

<b>Master File No.1</b>	
<b>Condition file: 1</b>	
Method	AUTO
Amp No.	1
Buret No.	1
Meas Unit	mV
S-Timer	10 sec
CP	0 mL
DP	0 mL
Direction	N/A
End Sens	100
Over mL	0 mL
Max Vol	20 mL
Mode No.	5
Unit	%
Blank	Blank result value
Factor	Titer of the titrant
Molarity	0.1
K	328.84
Formula	$(D-B) \times K \times F \times M / (S \times 10)$

<b>Mode No.5</b>	
Pre Int	0 sec
Del K	5
Del Sens	0 mV
Int Time	3 sec
Int Sens	3 mV
Brt Speed	2
Pulse	40

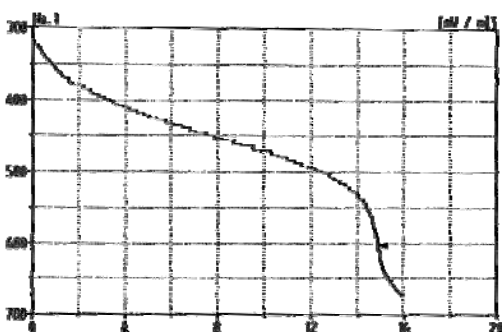
### 4. Measurement example



#### Blank measurement results

Sample No.	Titration value (mL)
1	0.012
2	0.012
<b>Avg.</b>	<b>0.012 %</b>

\* However, the control mode for blank measurement shall be set to waiting period (Int Time) to 3, burette speed (Brt Speed) to 2, minimum dropping volume (Pulse) to 5 and others to 0.



#### Sample measurement results

Sample No.	Sample volume (g)	Titration value (mL)	Concentration (%)
1	0.4942	14.946	99.87
2	0.4857	14.728	100.14
3	0.4956	14.970	99.75
<b>Avg.</b>			<b>99.92 %</b>
<b>Std. Dev.</b>			<b>0.20 %</b>
<b>C.V.</b>			<b>0.20 %</b>

## 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 ( $\text{HClO}_4$ ) 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  $1^\circ\text{C}$ ) 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
$\alpha$	:	Volumetric expansion coefficient for titrant (acetic acid = $1.07 \times 10^{-3}$ )
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, carteolol hydrochloride, Japanese Pharmacopoeia, perchloric acid titration, nonaqueous titration, sodium perchlorate saturated/acetic acid solution

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