

AQUACOUNTER Application Sheet	COM series	DATA No. K8	1st edition
Organic Acid	Fractionation quantification of ascorbic acid and sodium ascorbate		

1. Measurement outline

Ascorbic acid and sodium ascorbate, which is a salt of ascorbic acid, are quantified with fractionation. Ascorbic acid works as a strong reducing agent in addition to its role as an acid. On the other hand, sodium ascorbate does not work as an acid, but it also works as a reducing agent. The method for quantifying ascorbic acid is stipulated in JIS K 9502 and Japanese Pharmacopoeia. Ascorbic acid can be quantified by neutralization titration and iodine titration methods. This section introduces an example in which the total ascorbic acid quantity was measured by iodine titration method and sodium ascorbate was quantified with fractionation by subtracting the ascorbic acid quantity obtained by neutralization titration from it.

2. Reagents and Electrodes

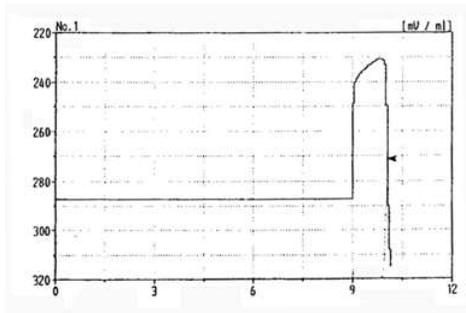
(1) Reagents	Titrant	1. 0.1mol/L potassium hydroxide titrant 2. 0.05mol/L iodine titrant
	Loading buffer	2% metaphosphoric acid solution, 50mL used for 1 measurement (for iodine titration) Potassium iodide crystal, approximately 1g (for iodine titration)
(2) Electrodes	Indicator electrode	Glass electrode GE-101B (for neutralization titration) <small>*standard accessory</small> Platinum electrode PT-301 (P/N D231244-A for iodine titration)
	Reference electrode	Reference electrode RE-201 to RE jack <small>*standard accessory</small>

3. Measurement conditions example (for COM-1600S + Buret B-2000-20 × 2 units)

(1) Method	Auto	
(2) End Sens	200	
(3) Mode	18 (iodine titration)	4 (neutralization titration)
Pre Int	0	0
Del K	0	9
Del Sens	0	0
Int Time	3	3
Int Sens	3	3
Brt Speed	2	2
Pulse	40	40

4. Measurement example

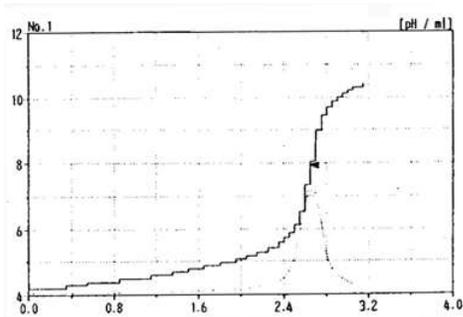
(1) Total ascorbic acid



Measurement results on total ascorbic acid (iodine titration)

Sample No.	Sample volume (g)	Titration value (mL)	Concentration (mg/g)
1	0.4007	10.035	2.507
2	0.4028	10.075	2.504
3	0.4010	10.031	2.504
Avg.			2.504 mg/g
Std. Dev.			0.0017 mg/g
C.V.			0.069 %

(2) Ascorbic acid



Measurement results on ascorbic acid (neutralization titration)

Sample No.	Sample volume (g)	Titration value (mL)	Concentration (mg/g)
1	0.4036	2.638	116.02
2	0.0918	0.600	116.02
Avg.			116.02mg/g

$$\begin{aligned}
 \text{Sodium ascorbate} &= \{ \text{total ascorbic acid} - 2 \\
 &\quad \times (\text{ascorbic acid}/176) \} \times 99 \\
 &= 117.54\text{mg/g}
 \end{aligned}$$

5. Outline

About various quantification methods for ascorbic acid

This section introduced the iodine titration method as a quantification method for ascorbic acid. The method stipulated in JAS is another method for quantifying ascorbic acid. This measurement method is also called indophenol method, and it is a titration method in which the end point is determined by the point where the color changes from blue to red by indophenol titrant under weak acidity (please see “A4” of the titration data). As a feature for this method, it is said to have high selectivity compared to the iodine method in quantification of ascorbic acid in fruit juice, etc.

Key words

Fractionation titration of ascorbic acid and sodium ascorbate, neutralization titration, oxidation-reduction titration, iodine titration

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