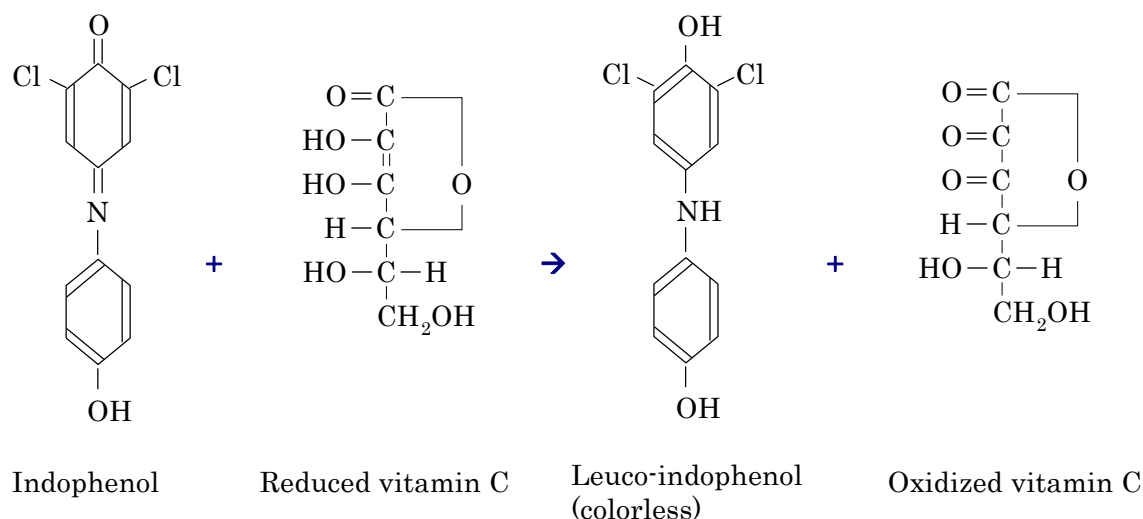


AQUACOUNTER Application Sheet	COM series	DATA No. A4	1st edition
Food and Beverage	Titration of vitamin C in juice		

1. Measurement outline

Indophenol titration method is widely used to quantify vitamin C (L-ascorbic acid). In this method, the sample is acidified with metaphosphoric acid/acetic acid solution and titrated with 2,6-dichlorophenol indophenol titrant. L-ascorbic acid is extracted and stabilized in metaphosphoric acid/acetic acid. The interference by the other reducing agent (i.e. Fe(II), sulfites, etc.) is suppressed at the same time. There are two end point detection methods. One detects the color change (blue to red) at the end point using transmittance measurement with a photometric probe, and the other detects the potential change using a platinum electrode. This section introduces the photometric detection method.



2. Reagents and Electrodes

(1) Reagents	Titrant	2,6-dichlorophenol indophenol titrant (1mL = 0.115mg VC)
	Loading buffer	Metaphosphoric acid (60g) + acetic acid (160mL) diluted to 1L with DI water.
(2) Electrodes	Photometric probe with 530nm filter	

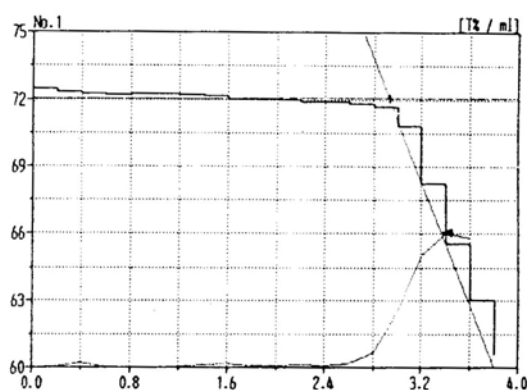
3. Measurement conditions example (for COM-1600M + Photometric unit)

Master File No.1	
Condition file: 1	
Parameters for Condition file 1	
Method	F-Cross
Buret No.	1
Meas Unit	mV
S-Timer	5 sec
CP	0 mL
DP	0 mL
Direction	N/A
End Sens	100
Over mL	0 mL
Max Vol	20 mL
Unit	%
Formula	$(D-B) \times K \times F \times M / (S \times 10)$ (To be set automatically)
Blank	0
Molarity	1.0
Factor	1.0
K	0.115 (The exact titre of the titrant)
Mode No.	21 (User define Mode)
Pre Int	0 sec.
Del K	0
Del Sens	0 mV
Int Time	15 sec.
Int Sens	10 mV
Br. Speed	2
Pulse (Min. Feed)	160 (0.2mL)

4. Measurement Procedure.

Take ca. 0.2g of sample. Weigh accurately. Add 100mL of deionized water and 10mL of metaphosphoric acid/acetic acid buffer. Titrate with 2,6-dichlorophenol indophenol titrant.

5. Measurement example



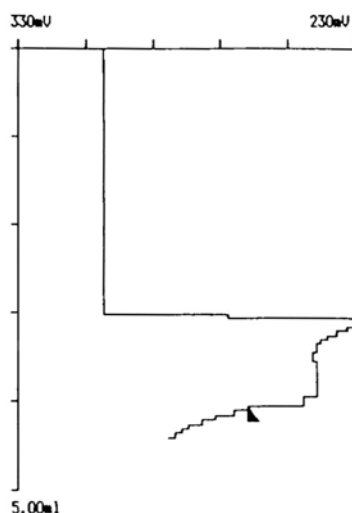
Citric acid measurement results

Sample No.	Sample size (g)	Titration value (mL)	Concentration (%)
1	0.142	2.860	0.232
2	0.142	2.857	0.231
3	0.163	3.281	0.231
4	0.162	3.260	0.231
5	0.147	2.929	0.229
Avg.			0.231 %
Std. Dev.			0.001 %
C.V.			0.475 %

6. Notes

Good results can be obtained by noting the following points in measurement:

- (1) When the volume of one drop is set too small, transmittance tends to be unstable at each dropping and titration does not advance well. It is possible to advance titration smoothly by setting the volume of one drop larger (Pulse or Min. Feed parameter in Mode), the interval time (Int. Time parameter in Mode) longer and interval sensitivity (Int. Sens parameter in Mode) to larger. The error in end point detection can be minimized even though the dropping volume is large, since the F-Cross detection method is adopted.
- (2) This method is a photometric titration method, and it cannot be applied to red or purple colored samples such as grape juice. If the sample size is small enough, the sample color may be negligible because of dilution.
- (3) There is also the method to measure the redox potential using a platinum electrode. The titration curve for this measurement is shown below. The potential change at the end point is as small as 20 – 30mV. Soaking the platinum electrode in the titration waste liquid in which excessive indophenol remains can improve the electrode sensitivity. This is a method in which the quality of electrode sensitivity greatly affects the titration precision.



Titration curve by potentiometric titration

Key words

Food product, indophenol, juice, vitamin C, JAS

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