

Sheet No.

GT200-ME028E Oil

Determination of purity of L (+)-ascorbic acid

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Method	: Oxidation-reduction titration
Apparatus	: Automatic Titrator Model GT-200 (GT0EF) Electrodes: Reference electrode, double junction (GTRE10B) *Inner solution: 1mol/l Potassium chloride *Outer solution: 1mol/l Potassium nitrate Platinum electrode (GTPT1B)
Titration mode	: INF, Detection: mV
Related standard	: Japanese Pharmacopoeia. Ascorbic acid/Quantitative method Seiji Takagi. Quantitative analysis: Experiments and calculation, Vol.2: Volumetric analysis. Kyoritsu Shuppan

*This application sheet is provided as reference, and does not assure the measurement results. Please consider analysis environment, external factors and sample nature for optimal conditions before the measurement.

Outline

L(+)-ascorbic acid (vitamin C) is used for products such as antioxidant for food, dietary supplements and medicines. Purity of L(+)-ascorbic acid is measured by oxidation-reduction titration using a platinum detection electrode.

Reagents

[Titration solution]

■0.05mol/L-iodine in water (Volumetric analysis grade)

[Adjustment reagents]

■Metaphosphoric acid in water ... Dissolve 1g metaphosphoric acid in pure water to 50ml total.

[Reagents for standardization]

■0.1mol/L-sodium thiosulfate in water (Volumetric analysis grade)

Analytical Procedure

[Standardization of titer of iodine solution using sodium thiosulfate solution]

- (1) Collect 10ml of 0.1mol/L-sodium thiosulfate solution (volumetric analysis grade) with a whole pipette and add it into a 100ml beaker.
- (2) Add approximately 50 ml pure water and titrate with 0.05mol/L-iodine solution.

[Calculation for standardization of titer]

Factor of iodine solution (f) = S x K1/A1 x 10

S : Collection quantity of 0.1mol/L-sodium thiosulfate (ml)

K1 : Molar concentration of 0.1mol/L-sodium thiosulfate . Factor

A1 : Titration volume of 0.05mol/L-iodine solution at the time of standardization of titer (ml)

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[Purity test of L(+)-ascorbic acid]

- (1) Accurately weigh 0.2g of L(+)-ascorbic acid in a 100ml beaker.
- (2) Collect 50ml metaphosphoric acid* solution using a measuring cylinder and add it into the beaker.
- (3) Agitate the solution to completely dissolve the L(+)-ascorbic acid.
- (4) Titrate with 0.05mol/L-iodine solution.

The metaphosphoric acid* solution turns gradually into orthophosphoric acid which serves as a stabilizer to prevent vitamin C from being oxidized by air.

[Calculation]

Purity of L(+)-ascorbic acid (%) = (A1 - BL) x M x E x f x FW/S x R/10 (Use fixed calculation formula)

- A1 : Titration volume of 0.05mol/L-iodine solution until an inflection point (ml)
 BL : Blank (0 because no blank measurement is conducted.)
 M : Molar concentration of 0.05mol/L-iodine solution (0.05)
 E : Equivalent number of 0.05mol/L-iodine solution (2Eq)
 FW : Quantity of ascorbic acid equivalent to one equivalent of iodine (88.06g/Eq)
 S : Sample volume (g)
 R : Dilution ratio (1)

Other Requirements

- Polish the surface of the platinum detection electrode very lightly using cleanser or the like.
- Make sure to confirm labels and safety data sheets of reagents and gases used for the measurement and handle them with enough care.
- Wear protective equipment (eye protector, gloves and others) when handling reagents. Measurement results

Measurement Results

	Sample size (g)	Titration Volume (ml)	Results (%)
1	0.2077	23.3100	100.1
2	0.2055	23.0576	100.1
3	0.2025	22.7372	100.2

Nos. of data	(n)	3
Average		100.1
Standard deviation	(SD)	0.04
Relative standard deviation	(RSD%)	0.04

Purity of L(+)-ascorbic acid was measured. The value measured by GT-200 was 100.1% and the relative standard deviation (RSD %) was 0.04%. GT-200 can measure the purity of L(+)-ascorbic acid with good repeatability.

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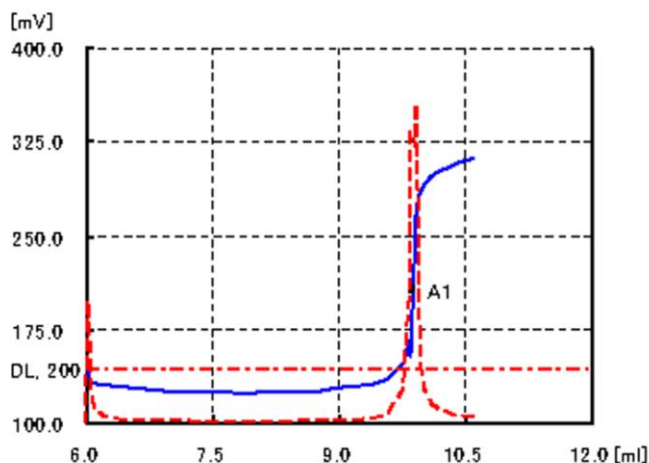
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ID No. : 33 GTNo.1

Measurement : 2014/11/28 11:43
 Sample name : 0.05M-I2

Type : Sample Titr
 Sample size (S) : 10 [ml]



C1 : 1.0125 [f]

A1 : 9.8768 [ml] 207 [mV]

Initial potential (Pi) : 278 [mV]

Start : 6 [ml] 149 [mV]

End : 10.6 [ml] 312 [mV] Time : 5'9"

Run file No. : 21

Titration file No. : 6

*Run file and Titration file parameters are set for each analysis item.

Mode : INF End1, End1 Width : 250 [mV] ± 500 [mV]

Detect : mV1

BRT No. : 1 Preset 1 Mode : V BRT : 1

Reagent : 15 Volume : 6 [ml]

WTint : 10 [sec]

Vup : 200 [ul]

Vlow : 10 [ul]

dE : 3 [mV]

dT : 5 [sec]

DL : 200 [mV/ml]

DetCnt : 10

Vmax : 20 [ml] C1 : S*K1/A1*10

Vover : 0.5 [ml] [f]

Reagent name (Reag) : I2

Equivalent (E) : 2

Molarity(M) : 0.05 [Mol/l]

Factor (f) : 1

Coefficient1(K1) : 0.1

Buret Injection Speed : 500 [ul/sec]

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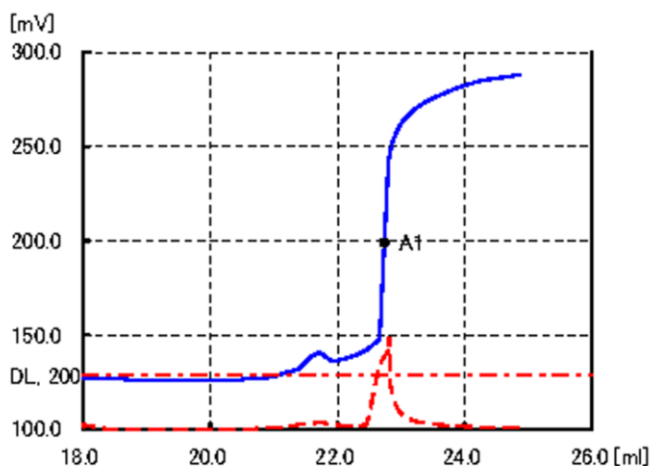
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ID No. : 3 GT No.1

User : GT-200

Measurement : 2014/12/01 12:02
 Sample name : L(+)-ascorbic acid

Type : Sample Titr
 Sample size(S) : 0.2025 [g]



C1 : 100.161 [%]

A1 : 22.7372 [ml] 199 [mV]

Initial potential (Pi) : 176 [mV]

Start : 18 [ml] 128 [mV]
 End : 24.866 [ml] 288 [mV]

Time : 7'46"

Run file No. : 18 Purity of L(+)-ascorbic acid

Titration file No. : 52 Purity of L(+)-ascorbic acid

*Run file and Titration file parameters are set for each analysis item.

Mode : INF End1, End1 Width : 250 [mV] ± 500 [mV]

Detect : mV1

BRT No. : 1 Preset1 Mode : V BRT : 1

Reagent : 28 Volume : 18 [ml]

WTint : 10 [sec] Position : Titration

Vup : 200 [μl]

Vlow : 10 [μl]

dE : 3 [mV]

dT : 5 [sec]

DL : 200 [mV/ml]

DetCnt : 15

Vmax : 50 [ml]

C1 : (A1-BL)*M*E*f*FW/S*R/10

Vover : 0.5 [ml]

[%]

Reagent name (Reag) : I2

Equivalent (E) : 2

Molarity(M) : 0.05 [Mol/l]

Factor (f) : 1.013

Blank (BL) : 0 [ml]

Formula weight (FW) : 88.06

Dilution rate (R) : 1

Buret Injection Speed : 500 [ul/sec]