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Diploma in Pharmacy 1st Year

Pharmaceutical Chemistry

Experiment

To perform the assay of Ascorbic acid by Iodometry.

Aim:

To perform the assay of Ascorbic acid by Iodometry.

Reference :

‘ Dr. Gupta G.D. , Dr. Sharma Shailish , Kaur Baljeet ’ “Practical Manual of Pharmaceutical Chemistry” Published by Nirali Prakashan, Page no 45 - 48

Apparatus and Material Required :

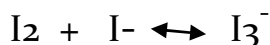
Burette and stand, volumetric flask, pipette, measuring cylinders, conical flasks, 1.0 M sulphuric acid, and 0.05M iodine.

Theory:

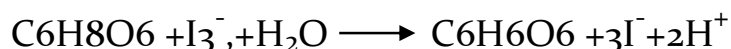
- A redox titration is one method for determining the amount of vitamin C in food. Because there are additional acids in juice, but few of them interact with the oxidation of ascorbic acid by iodine, the redox reaction is preferable to an acid-base titration.
- The triiodide ion is quickly converted to the iodide ion as long as vitamin C is present in the solution. When all of the vitamin C is oxidised, however, iodine and triiodide are present, and they react with starch to form a blue-black complex. The titration's endpoint is the blue-black colour.

Chemical Equations

Iodine is relatively insoluble, but by combining it with iodide to make triiodide. this can be improved:



Vitamin C is oxidised by triiodide to form dehydroascorbic acid:



Procedure:

1% Starch Indicator Solution

- 1) 0.05 g soluble starch should be added to 50 near-boiling distilled water.
- 2) It should be mixed well and allowed to cool before use. (doesn't have to be 1%; 0.5% is fine)

Iodine Solution

- 1) 5.00 g potassium iodide (KI) and 0.268 g potassium iodate (KIO₃) should be dissolved in 200 ml of distilled water.
- 2) 30 ml of 3 M sulphuric acid should be added.
- 3) This solution should be poured into 500 ml advanced cylinder and it should be diluted to a final volume of 500 ml with distilled water.
- 4) The solution should be mixed.
- 5) The solution should be transferred to 600 ml beaker. The label should be labelled as iodine solution.

Vitamin C Standard Solution

- 1) 0.250 g vitamin C (ascorbic acid) should be dissolved in 100 ml distilled water.
- 2) It should be diluted to 250 ml with distilled water in a volumetric flask. The flask should be labelled as vitamin C standard solution.

Titration

- 1) 20 ml aliquot of the sample solution should be pipette out into 250 ml conical flask and 150 ml of distilled water and 1 ml of starch indicator solution should be added.
- 2) The sample should be titrated with 0.005 mol L⁻¹ iodine solution. The first trace of a dark blue-black colour due to the starch-iodine complex detected as the endpoint of titration.
- 3) The titration should be repeated with further aliquots of sample solution until concordant results are obtained.

Observation Table

S. No.	Volume of Ferrous Ammonium	Burette Reading		Volume of KMnO ₄ Rundown
		Initial	Final	
1	30ml	0	23	23
2	30ml	23	24.5	24.5
3	30ml	24.5	26	26

Calculation

$$\text{Average} = \frac{23+24.5+26}{3} = 24.5$$

$$M_1 V_1 = M_2 V_2$$

$$M_2 = \frac{M_1 V_1}{V_2} = \frac{0.05 \times 10}{24.5} = 0.0204$$

Where,

$$M_1 = 0.05M$$

$$V_1 = 10ml$$

$$V_2 = 24.5ml$$

$$\text{Purity} = \frac{\text{Titre value} \times \text{Equivalent weight factor} \times \text{Molarity of titrant (actual)}}{24 \text{ Weight of sample} \times \text{Molarity of titrant (expected)}} \times 100$$

Where,

$$\text{Titre value} = 24.5$$

$$\text{Equivalent weight factor} = 0.02063$$

$$\text{Molarity actual} = 0.0204$$

$$\text{Molarity (expected)} = 0.26$$

$$\text{Purity} = \frac{0.02063 \times 24.5 \times 0.0204}{1.031 \times 0.05 \times 0.26} \times 100 = 79\%$$

Result: The percentage purity of the ascorbic acid sample was found to be 79 %.

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