CHAPTER-12

Experiment: 12

TO PERFORM ASSAY OF CALCIUM GLUCONATE TABLET (ACID-BASE TITRATION) AND STANDARDIZATION OF TITRANT

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Aim:

Explain quantitative estimation of calcium gluconate.

Requirements:

A. Glassware & Instruments:

1. Test tube
2. Test tube holder
3. Spatula

B. Chemicals & Reagents:

1. Calcium gluconate
2. Dilute HCl
3. Dilute NaOH solution
4. Distilled water
5. Ammonium carbonate

Theory:

Calcium gluconate can be easily estimated when some substance is dissolved in minimum quantity of HCl and then neutralized with dil. NaOH solution and thus precipitate is formed which indicates presence of Ca^{2+} ion.

Principle:

This titration is basically a precipitation type of titration in which a precipitate is formed after the end point. The reaction is very simple as the substance is dissolved in HCl and neutralized with dil. NaOH. As calcium is insoluble in NaOH it forms a precipitate and it indicates presence of calcium in calcium gluconate.

Procedure:

Standardization of EDTA:

- Weigh precisely 0.8 g of zinc granules and dissolve them in 12 ml of diluted HCl and 5 drops of Br_2 water using mild heating.
- Boil to remove excess bromine, cool, and add enough DW to fill a volumetric flask to 200 ml.

- Transfer 20 ml of the resultant solution to a flask and neutralise with 2 N NaOH. Dilute to approximately 150 ml with DW, add sufficient ammonia buffer (pH 10.0) to dissolve the precipitate, and add an excess of 5 ml.
- Lastly, add 50 mg of the mixture of Mordant Black II and titrate with the disodium edetate solution until the solution turns green.
- One ml of 0.05 M disodium ethylenediaminetetracetate equivalent to 0.003269 grammes of granulated zinc.

Estimation of calcium gluconate:

- Accurately weigh 20mg of material and dissolve it in the smallest amount of diluted HCl. • Neutralize with dil.
- 5 ml of NaOH solution or 5 ml of a 10 percent w/v sample solution was mixed with water.
- 5 ml of ammonium carbonate solution was then added, and the solution was boiled and cooled before being seen.

Calculations:

$C_{12}H_{22}CaO_{14} = Ca^{2+}$ = 1000ml M

Or 65.38g Ca = 1000ml M

Or 32.69g Ca = 1000ml 0.05M

Or 0.003269 Ca = 1ml of 0.05M NaOH

Applications:

1. Calcium gluconate is the calcium salt of gluconic acid and has multiple applications, including calcium replenishment in calcium-deficient patients and treatment of hypocalcemic tetany.
2. As it is a mineral supplement, it can be administered intravenously for the treatment of low blood calcium, magnesium toxicity, and excessive blood potassium.

Result:

From the experiment, we can conclude that calcium ion is present in the substance since it forms a white amorphous precipitate and gives ferric chloride solution

a yellow colour. The percentage purity of the given sample of Calcium gluconate is ……..

Viva questions:

- Write the sample's weight in accordance with the IP
- Describe the assay principle for calcium gluconate.
- List the applications of disodium edetate.
- Write the calcium gluconate assay procedure.
- Write the chemical reaction involved in the assay for calcium gluconate.
- Describe the equipment used in titration.
- The structure of disodium edetate is depicted.
- Draw a diagram of calcium gluconate.
- Write the calcium gluconate standards per IP
- Draw the calcium edetate complex structure.
- Calculate the factor for the calcium gluconate assay.
- Explain the meaning of the following: Ligand, Chelating agent, Seaquestering agent.