

Calculation:

$$\text{Percentage Purity} = \frac{V \times E \times AM \times 100}{W \times RM}$$

Where,

V is a volume of EDTA used

$$V = A - B$$

A is the volume of EDTA used in the titration with calcium gluconate

B is the volume of EDTA used in the titration without calcium gluconate

E is an equivalent factor

AM is an actual molarity

RM is a required molarity

W is the weight of the sample

For 01 ml of calcium gluconate, the equivalent factor of 0.05 M disodium edetate is 0.02242

Chemical Reaction:

Practical - 10

Date:/...../.....

Aim: To determine percent content of Calcium gluconate in a given sample.

Reference:.....
.....

Requirements:

Apparatus/Equipment required:.....

Chemical required:.....
.....

Principle

Calcium gluconate is assayed by complexometric titration using disodium EDTA a titrant. This is a type of replacement titration. In this assay magnesium sulphate is added to increase the sensitivity and to give sharp end point. In the beginning magnesium forms complex with indicator and produces pink colour. The magnesium indicator complex is more stable than that of calcium indicator complex. When EDTA solution is added, it forms complex with EDTA. When all the calcium has been consumed the next drop of EDTA will break the magnesium indicator complex. Thus the free indicator will show blue colour at the end point. During the titration the pH is maintained at 10 by the addition of ammonia-ammonium chloride buffer and mordant black-II is used as indicator.

Standard

Calcium gluconate (mol. wt.: 448.4) contains not less than 98.5 % and not more than 102.0 % of $C_{12}H_{22}CaO_{14}$, H_2O .

Procedure

Preparation of 0.1M disodium edetate solution

Dissolve _____ g of disodium edetate in sufficient water to produce 1000 ml

A. Standardization of 0.1M disodium edetate solution

1. Weigh accurately about 0.8 g of granulated zinc dissolve by gentle warming in 12 ml of dil. Hydrochloric acid and 0.1 ml of bromine water.
2. Boil to remove excess bromine, cool and add sufficient water to produce 200ml.
3. Pipette 20 ml of the resulting solution into a flask and nearly neutralize with 2M sodium hydroxide.
4. Dilute to about 150 ml with water add sufficient ammonia buffer pH 10.0 to dissolve the precipitate and add 5 ml in excess.
5. Add 50 mg of mordant black II mixture and titrate with the disodium edetate solution until the solution turns green.

Assay of calcium gluconate

1. Weigh 0.5 g and dissolve in 50 ml of warm water; cool.
2. Add 5.0 ml of 0.05 M magnesium sulphate and 10 ml of strong ammonia solution
3. Titrate with 0.05 M disodium edetate using mordant black II mixture as an indicator.

Titration procedure:

- All glassware should be cleaned and dried according to standard laboratory procedures.
- Before filling the burette for the titration, rinse it with distilled water and then pre-rinse it with a portion of the titrant solution. Pre-rinsing is required to make sure that all solution in the burette is the desired solution, not a contaminated or diluted solution.
- Take the unknown stock solution of titrant in a clean and dry beaker then fill the burette using the funnel.
- Remove air bubbles from the burette and adjust the reading to zero.
- Take 0.5 gm of calcium gluconate and pour it into a conical flask, and dissolve in 50 ml of warm water.
- Allow the solution to cool to ambient temperature, add 05 ml of 0.05 M magnesium sulphate solution
- Using a pipette, add 10.00 ml of strong ammonia-ammonium chloride solution.
- Then, as an indicator, add 2 drops of mordant black II mixture and properly mix it.
- Titrate the sample solution with standardized disodium edetate until the endpoint is reached. The actual endpoint is indicated by a change in the color of the solution.
- Properly record the readings of the burette.
- To get accurate results, repeat the titration three times.
- Take their mean and calculate the percentage purity of calcium gluconate.
- For a blank reading (B), repeat the titration using the same procedure but without the calcium gluconate.

Observation table:

Sr. No.	Content in conical flask	Burette reading		Volume of titrant used (ml)
		Initial	Final	
1				
2				
3				
				Mean:

Report: The percentage purity of calcium gluconate was found to be _____.

Questions Bank

1. Write the chemical formula of calcium gluconate.
2. How can we prepare the ammonia solution?
3. What is the full form of EDTA?
4. What is the bromine water?
5. Draw the diagram of Pipette.
6. What is the blank titration?
7. What is the buffer solution?
8. What is the full form of pH?
9. What is the complexometric titration?
10. Calculate the molecular weight of Calcium gluconate.