Chemistry | Analytical chemistry

Determination of Concentration of Silver nitrate by Fajan's method

General Aim

Determine the concentration of silver nitrate using the standard solution of sodium chloride.

Method

Fajan's method.

Learning Objectives (ILOs)

- Understand fajan's method.
- Analyze silver nitrate solution by following Fajan's method.
- Explain how adsorption indicators show change in color after end point.

Theoretical Background/Context

Precipitimetry: It is a volumetric method of analysis that involves the formation of a practically insoluble salt using a precipitating agent.

Solubility product (Ksp): In a saturated solution of a sparingly soluble electrolytes, the product of molar concentration of ions each raised to a power equal to the number of ions produced is constant at room temperature and pressure.

Ksp of AnBm =[A]n[B]m

N.B: Substance with low Ksp precipitate first.

Conditions required for a Preciptimetric reactions:

1. The precipitate must be practically insoluble.
2. Rapid precipitation.
3. Ease of detection of the endpoint.

Principle of Work

Adsorption indicator: Adsorption indicators are acidic or basic dyes which change their color upon adsorption on the precipitate at the equivalence point. It has colour when not adsorbed and another colour when adsorbed on ppt.

Types:

- Weak acid: e.g. Eosin & Fluorescein.
- Weak base: e.g. Rhodamine-6-G.

For Successful use of adsorption indicator, precipitate must be:

- Colloidal à surface area increases à Adsorption increase.
- Precipitate strongly adsorb its own ion.

Indicator must be:

- Opposite in charge to titrant.
- Its adsorption power is not higher than the ion to be determined (Adsorbed after complete precipitation).
- Suitable concentration of indicator to precipitate after complete precipitation of ions (not exceeding the ksp of its silver salt during the titration).

Medium must be:

- Suitable for ionization of indicators.
- Acid indicator acts in alkaline media.
- Basic indicator acts in acid media.

- This method involves the use of adsorption indicator.
- Titration of NaCl standard with AgNO3 solution using adsorption indicator.