

Determination of concentration of chlorides in water sample by Volhard's method



General Aim

Determine the concentration of chlorides in water sample by Volhard's method.

Method

Volhard's method

Learning Objectives (ILOs)

- Understand Volhard's method.
- Analyze Chloride by following Volhard's method.

Theoretical Background/Context

- **Precipitometry:** It is a volumetric method of analysis that involves the formation of a practically insoluble salt using a precipitating agent.
- **Solubility product (K_{sp}):** 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.

$$K_{sp} \text{ of } A_nB_m = [A]^n[B]^m$$

N.B: Substance with low K_{sp} precipitate first.

Conditions required for a Precipitometric reactions:

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

Endpoint detection in Precipitometry.

Principle of Work

- Volhard's method (Formation of colored complex):
 - q Direct: Ag⁺ ions titrated by thiocyanate using ferric alum as indicator, End point: First faint red color.
 - q Indirect: Known excess standard AgNO₃ precipitate halides, cyanide, phosphate then back titrate excess unreacted AgNO₃ by thiocyanate using ferric alum as indicator, End point: First faint red color.
- Here we are using the indirect Volhard's method (back titration):
 - In Acidic medium (pH 1-3)
 - Known excess standard AgNO₃ precipitate chloride,
 - then back titrate excess unreacted AgNO₃ by thiocyanate using ferric alum as indicator,

End point: First faint red color

