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ESTIMATION OF AMOUNT OF CHLORINE IN A WATER SAMPLE

★ AIM:

→ To estimate the amount of chlorine in a water sample by Mohr's method.

★ PRINCIPLE:

→ It is an example of precipitation reaction. The reaction between chloride and silver nitrate is direct and simple.

$$AgNO_3 + NaCl \longrightarrow AgCl + NaNO_3$$

$$Ag^+ + Cl^- \longrightarrow AgCl$$

→ K_2CrO_4 is the indicator. Reaction with K_2CrO_4 with $AgNO_3$ is as follows:

$$2AgNO_3 + K_2CrO_4 \longrightarrow Ag_2CrO_4 + 2KNO_3$$

★ PROCEDURE:

(1) Titration 1 – Standardisation of $AgNO_3$ solution.

→ 20 ml of standard NaCl solution (N/20) is pipetted out into a clean conical flask.

→ 1 ml of 2% K_2CrO_4 indicator is added to it. The sol. turns yellow in colour.

→ It is titrated against $AgNO_3$ solution taken in the burette.

→ During each addition of $AgNO_3$, the content in the conical flask is shaken well.

→ At the end point, the yellow colour changes to brownish red colour. The titration is repeated for concordant values.

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(2) Titration 2: Estimation of Chloride

→ The given chloride solution is made upto 100 ml in a standard flask.

→ Exactly 20 ml of this solution is pipetted out into a a clean conical flask.

→ To this solution 1 ml of 2% K_2CrO_4 indicator is added.

→ It is titrated against standardised $AgNO_3$ solution from the burette. The titration is repeated for concordance.

→ From the volume of $AgNO_3$ consumed, the strength of chloride and hence its amount is calculated.

★ OBSERVATIONS:

(1) TABLE 1: (Standardization of $AgNO_3$)

S.No.	Volume of NaCl solution (ml)	Burette Reading (ml)		Concordant value (ml)	Indicator
		Initial	Final		
1	10	0	9.1	9.1	K_2CrO_4
2	10	0	9.1		K_2CrO_4
3	10	0	9.1		K_2CrO_4

(2) TABLE 2: (Estimation of Chloride)

S.No.	Volume of Chloride solution (ml)	Burette Reading (ml)		Concordant Value (ml)	Indicator
		Initial	Final		
1	10	0	8.6	8.6	K_2CrO_4
2	10	0	8.6		K_2CrO_4
3	10	0	8.6		K_2CrO_4

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★ **CALCULATIONS:**

(1) **For TABLE 1:**

Normality of NaCl solution = $N_1 = 0.02\ N$

Volume of NaCl solution = 10 ml (V_1)

Volume of $AgNO_3$ solution = V_2 (end point) = 9.1 ml

Normality of $AgNO_3$ solution = N_2 = ?

$$\therefore N_2 = \frac{V_1 \times N_1}{V_2} = \frac{10 \times 0.02}{9.1} = 0.02197\ N //$$

(2) **For TABLE 2:**

Volume of chloride solution = 10 ml (V_1)

Normality of chloride solution = N_1 = ?

Volume of $AgNO_3$ solution = V_2 (end point) = 8.6 ml

Normality of $AgNO_3$ solution = $N_2 = 0.02197\ N$

$$\therefore N_1 = \frac{V_2 \times N_2}{V_2} = \frac{8.6 \times 0.02197}{10} = 0.0188\ N //$$

Thus, the amount of chloride present in the whole of the given solution = $N_1 \times \frac{35.46}{10}$

$$= 0.0188 \times \frac{35.46}{10} \Rightarrow 0.0666\ g/100ml$$

★ **RESULT:**

→ Amount of chloride present in whole solution is 0.0666 g/100ml.

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