

Signature of the teacher

EXPERIMENT NO :

DATE:

Determination of CaO in the given sample of Cement by rapidEDTA method.

PRINCIPLE; The major constituents of Portland cement are silicates of calcium,

aluminium and iron with small quantity of oxides of alkali metals. The average composition of Portland cement is as follows.

CaO-63.80% ,SiO₂-20.7% ,Al₂O₃-5.6%, Fe₂O₃-2.5% MgO-3.7%, TiO₂-0.23% Na₂O-0.21% K₂O-0.51% SO₃-1.75%

Use of Eriochrome Black T as indicator gives the total concentration of Ca²⁺ and Mg²⁺ ions while Patton and Reeder's indicator would allow estimation of only calcium ions in the presence of Magnesium ions. For this purpose, P^H of 12-14 has to be maintained. Addition of Diethyl amine and sodium hydroxide serve the purpose. Addition of Glycerol helps in getting sharp end point by avoiding the adsorption of indicator on the precipitate particles.

PROCEDURE:

Part A: Preparation of solution of Disodium salt of EDTA

Weigh accurately the given disodium of EDTA and transfer onto the funnel placed on 250cm³ volumetric flask. Dissolve by adding small quantity of deionised water. Make it up to the mark and shake well to get uniform concentration.

Part B: Estimation of CaO:

Pipette out 25cm³ of given cement solution into a clean conical flask using pipette rinsed with the same solution. Add 5cm³ of Glycerol. Add 5cm³ of Diethyl amine. Adjust the pH of the solution by adding 10cm³ of 4N NaOH solution. Add about 50cm³ of deionised water and few drops of Patton and Reeder's indicator. Titrate the solution against the EDTA solution taken in the burette until the colour changes from wine red to pure blue. Note down the burette reading and repeat the titration to get concordant values.

Experiment no

Observation and Calculations

Part A: Preparation of standard EDTA solution

Weight of weighing bottle and EDTA salt:

Weight of empty weighing bottle:

Weight of EDTA salt:

$$\text{Molarity of EDTA} = \frac{\text{Weight of EDTA salt} \times 4}{\text{Molecular weight of EDTA} \times 4} = \frac{W \times 4}{372.24} \quad (X)$$

Part B: Estimation of calcium oxide in cement

Burette: Standard EDTA solution

Conical flask: 25 cm³ of Cement solution + 5 cm³ of Glycerol + 5 cm³ diethyl amine + 10 cm³ of 4N NaOH solution

Indicator: A pinch of Patton Reeder's indicator

End point: Wine red to Blue

Trial	I	II	III
Burette readings			
Final reading			
Initial reading			
Volume of EDTA run down in cm ³			

1000 cm³ of 1M EDTA solution = 56.08 g of CaO

Therefore V cm³ of X M EDTA = $\frac{X \times V \times 56.08}{1000}$ (a g)

25 cm³ of cement solution contains ----- (a) g of CaO

Therefore 250 cm³ of cement solution contains a x 10 g of CaO = ----- (Zg)

Weight of cement dissolved in 250 cm³ of its solution = W g = -----
Z x 100

Percentage of CaO in cement = ----- B
W

RESULT: Percentage of CaO in cement = ----- (B)