Viva-voce

[10 questions × 2 marks = 20 Marks]

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1. What is the role of EBT and EDTA in Hardness Estimation ?

ANS.: EDTA is a complexing agent and form complex with the metal ions (Ca^{2+}, Mg^{2+}) present in hard water.

EBT acts as an indicator to detect the end point of titration.

2. Explain the reaction of the generation of nascent oxygen and its use in Winkler's method.

ANS. :

$$2 KMnO_4 + 3 H_2SO_4 \longrightarrow K_2SO_4 + 2 MnSO_4 + 3H_2O + 5 [O]$$

The Winkler method uses titration to determine dissolved oxygen in water sample.

3. Draw the graph pattern for the estimation of sulphate ion by conductivity method and explain why the plot is increasing after the lowest point at the intersection.

ANS. :

conductance →

end point

volume of titrant added →
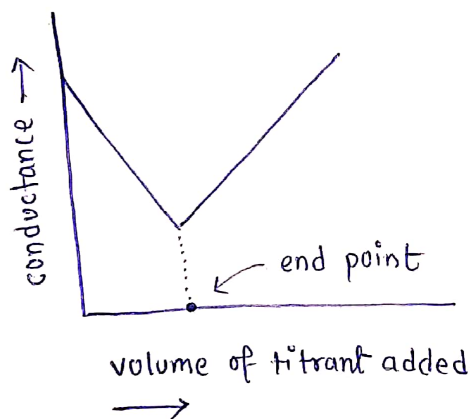
The conductivity falls due to removal of free sulphate as precipitate until the equivalence point is reached and then increases due to excess of OH^- ions.

e.g.
$$MgSO_4 + Ba(OH)_2 \rightarrow Mg(OH)_2 + BaSO_4 \downarrow$$
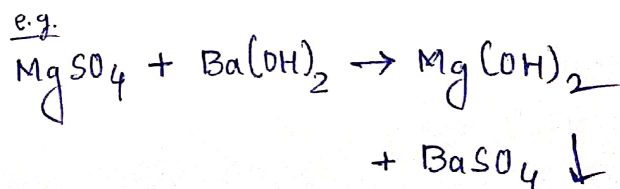
4. Explain the methodology involved in the estimation of Nickel by calorimetry.

Ans.: Calorimetric estimation of $Ni(II)$ ions in aqueous solution: It is found that $Ni(II)$ ions have maximum absorbance at 393 mm in distilled water and in aqueous sucrose solution (0.3 mol dm^{-3}).

5. Write down the cell reaction and net EMF of Daniel cell.

Ans.: Cell reaction of Daniell Cell: $Zn(s) + Cu^{2+}(aq.) \rightarrow Zn^{2+}(aq.) + Cu(s)$

Net emf: $E_{cell} = E^{\circ}_{cell} - \dfrac{0.059}{2} \log \dfrac{[Zn^{2+}]}{[Cu^{2+}]}$.

6. In the estimation of iron in carbon steel by potentiometry, a rapid change in the potential is observed at the end point. why?

Ans.: In the potentiometric estimation of iron, as the concentration of Fe^{2+} changes rapidly ($Fe^{2+} + 2\bar{e} \rightarrow Fe$), the potential ($E_{cell}$) changes correspondingly.

7. Explain the principle behind the estimation of ferrous ion by colorimetry.

Ans. The absorbance of various solutions with known concentrations of iron was measured to determine a calibration curve. The absorbance of an unknown was then determined to access the amount of iron in the unknown. The relationship that links absorbance with concentration and path length is given by Beer-Lambert's Law:

$$A = E\,c\,l$$

8. What is the relationship between molecular weight of the polymer and viscosity?

Ans. Relation: $[\eta] = K \cdot M^{a}$, where $[\eta]$ = intrinsic viscosity of polymer.

M = molecular weight of polymer.

K and a are constants, depends on the solvent, polymer size, shape, and temperature.

9. How the concentration of given solution can be related to absorbance ?

ANS. : According to Beer's Law, the absorbance of a light absorbing material is proportional to its concentration in solution.

$$A = E c l.$$

10. What are the disadvantages of hard water ?

ANS.
1. Bathing problem : Hard water does not lather freely with soap solution, but produces scum in the bath tub and body.

2. cooking problem : Due to presence of dissolved hardness producing salts, the boiling point of water is elevated.