CHAPTER

30

Principles Related to Practical Chemistry

1. An alkali is titrated against an acid with methyl orange as indicator, which of the following is a correct combination?

	Base	Acid	End point
(a)	Weak	Strong	Colourless to pink
(b)	Strong	Strong	Pinkish red to yellow
(c)	Weak	Strong	Yellow to pinkish red
(d)	Strong	Strong	Pink to colourless

(2018)

2. A white sodium salt dissolves readily in water to give a solution which is neutral to litmus. When silver nitrate solution is added to the aforementioned solution, a white precipitate is obtained which does not dissolve in dil. nitric acid. The anion is

(a) S^{2-} (b) SO_4^{2-}

(c) CO_3^{2-} (d) Cl^- *(Online 2018)*

3. For standardising NaOH solution, which of the following is used as a primary standard?

(a) Oxalic acid (b) Ferrous ammonium sulphate

(c) Sodium tetraborate (d) Dil. HCl

(Online 2018)

4. The incorrect statement is

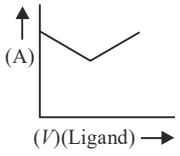
(a) ferric ion gives blood red colour with potassium thiocyanate

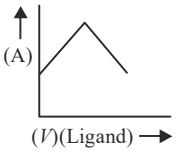
(b) Cu^{2+} and Ni^{2+} ions give black precipitate with H_2S in presence of HCl solution

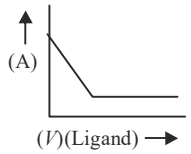
(c) Cu^{2+} salts give red coloured borax bead test in reducing flame

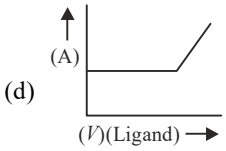
(d) Cu^{2+} ion gives chocolate coloured precipitate with potassium ferrocyanide solution. *(Online 2018)*

5. In a complexometric titration of metal ion with ligand *M*(Metal ion) + *L*(Ligand) → *C*(Complex), end point is estimated spectrophotometrically (through light absorption). If '*M* ' and '*C* ' do not absorb light and only '*L*' absorbs, then the titration plot between absorbed light (*A*) versus volume of ligand '*L*' (V)would look like

(a) 

(b) 

(c) 

(d) 

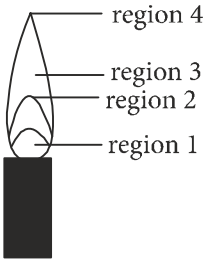
(Online 2018)

6. A solution containing a group-IV cation gives a precipitate on passing H_2S. A solution of this precipitate in dil. HCl produces a white precipitate with NaOH solution and bluish white precipitate with basic potassium ferrocyanide. The cation is

(a) Co^{2+} (b) Ni^{2+}

(c) Zn^{2+} (d) Mn^{2+} *(Online 2017)*

7. The hottest region of Bunsen flame shown in the figure below is



(a) region 1

(b) region 2

(c) region 3

(d) region 4.

(2016)

8. The most appropriate method of making egg-albumin sol is

(a) break an egg carefully and transfer the transparent part of the content to 100 mL of 5% *w*/*V* saline solution and stir well.

(b) keep the egg in boiling water for 10 minutes. After removing the shell, transfer the yellow part of the content to 100 mL of 5% *w*/*V* saline solution and homogenize with a mechanical shaker.

(c) keep the egg in boiling water for 10 minutes. After removing the shell, transfer the white part of the content to 100 mL of 5% *w*/*V* saline solution and homogenize with a mechanical shaker.

(d) break an egg carefully and transfer only the yellow part of the content to 100 mL of 5% *w*/*V* saline solution and stir well.

(Online 2016)

9. Sodium extract is heated with concentrated HNO_3 before testing for halogens because
(a) Ag_2S and AgCN are soluble in acidic medium
(b) silver halides are totally insoluble in nitric acid
(c) S^{2-} and CN^-, if present, are decomposed by conc. HNO_3 and hence do not interfere in the test
(d) Ag reacts faster with halides in acidic medium.
(Online 2016)

10. An aqueous solution of a salt *X* turns blood red on treatment with SCN^- and blue on treatment with $K_4[Fe(CN)_6]$. *X* also gives a positive chromyl chloride test. The salt *X* is
(a) $CuCl_2$ (b) $FeCl_3$
(c) $Cu(NO_3)_2$ (d) $Fe(NO_3)_3$ *(Online 2015)*

11. The cation that will not be precipitated by H_2S in the presence of dil. HCl is
(a) Cu^{2+} (b) Pb^{2+}
(c) As^{3+} (d) Co^{2+} *(Online 2015)*

12. Which of the following reagents may be used to distinguish between phenol and benzoic acid?
(a) Aqueous NaOH (b) Tollens' reagent
(c) Molisch reagent (d) Neutral $FeCl_3$ *(2011)*

13. Biuret test is not given by
(a) proteins (b) carbohydrates
(c) polypeptide (d) urea. *(2010)*

14. The compound formed in the positive test for nitrogen with the Lassaigne solution of an organic compound is
(a) $Fe_4[Fe(CN)_6]_3$ (b) $Na_3[Fe(CN)_6]$
(c) $Fe(CN)_3$ (d) $Na_4[Fe(CN)_5NOS$. *(2004)*

ANSWER KEY

1. (c) **2.** (d) **3.** (a) **4.** (b) **5.** (d) **6.** (c) **7.** (b) **8.** (a) **9.** (c) **10.** (b) **11.** (d) **12.** (d) **13.** (b) **14.** (a)

Explanation

1. (c) : Methyl orange shows yellow colour in basic medium and red colour in acidic medium.

2. (d) : The anion is Cl^-. Sodium salt of Cl^-, *i.e.*, NaCl is neutral to litmus.

$$NaCl + AgNO_3 \rightarrow \underset{\text{White ppt.}}{AgCl\downarrow} + NaNO_3$$

AgCl does not dissolve in dil. nitric acid.

3. (a) : Oxalic acid is used as a primary standard for standardising sodium hydroxide solution.

4. (b) : (a) Ferric ion gives blood red colour with potassium thiocyanate.

$$FeCl_3 + 3\,KCNS \longrightarrow \underset{\text{Blood red colour}}{Fe(CNS)_3} + 3KCl$$

(b) For the precipitation of group IV radicals, a high concentration of S^{2-} ions is required. H_2S in the presence of HCl gives a small amount of S^{2-} ions due to common ion effect. Then, NiS is not precipitated.

(c) Cu^{2+} ions give copper brown coloured or red bead in reducing flame and bluish green bead in oxidising flame.

(d) Cu^{2+} ions on acidifying with dilute acetic acid and then on treating with potassium ferrocyanide solution forms a chocolate coloured precipitate.

$$Cu^{2+} + 2CH_3COOH \longrightarrow Cu(CH_3COO)_2$$

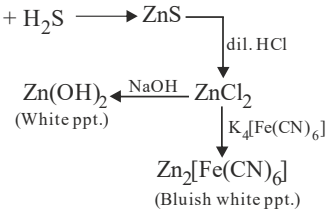
$$2Cu(CH_3COO)_2 + K_4[Fe(CN)_6] \longrightarrow \underset{\substack{\text{Chocolate}\\ \text{ppt.}}}{Cu_2[Fe(CN)_6]} + 4CH_3COOK$$

5. (d) : Metal ion + ligand $\longrightarrow$ complex

(M) (L) (C)

In the beginning of the titration, when ligand is added to solution containing metal ions, the metal ions and ligand form the complex. No light would be absorbed at this stage, as ligand gets completely consumed by metal ions. Then, the graph would be a straight line with absorbed light remaining constant. After all the metal ions get consumed, on further addition of ligand, the light absorbed increases sharply.

6. (c) :



7. (b) : Region-2 is the blue flame which is the hottest region of Bunsen flame.

8. (a) : Egg albumin is the transparent liquid contained in the egg.

9. (c) : S^{2-} and CN^- ions if present may interfere by giving white ppt. of AgCN and black ppt. of Ag_2S with $AgNO_3$ thus, before testing for halogens they are decomposed by conc. HNO_3.

10. (b) : Fe^{3+} radical gives blood red colour with SCN^- and blue colour with $K_4[Fe(CN)_6]$.

Cl^- radical gives chromyl chloride test.

Thus, the salt X is $FeCl_3$.

11. (d) : Co^{2+} ion present in group IV is precipitated by H_2S in presence of NH_4OH. Other ions are precipitated as sulphide in presence of dil. HCl in group II.

12. (d) : Phenol gives violet colouration with neutral ferric chloride solution.

Benzoic acid gives buff coloured (pale dull yellow) precipitate with neutral ferric chloride solution.

13. (b) : Biuret test is used to characterise the presence of —CONH group in a compound.

14. (a) : $3Na_4[Fe(CN)_6] + 4Fe^{3+} \rightarrow \underset{\text{Prussian blue}}{Fe_4[Fe(CN)_6]_3} + 12Na^+$