CHAPTER - 24
PRACTICAL CHEMISTRY

PART-I (JEE MAIN)

SECTION-I- Straight objective type questions

1. The correct formula of potash alum is

   1) $K_2SO_4.Al_2(SO_4)_3.12H_2O$ 2) $KAl(SO_4)_2.24H_2O$

   3) $KAl(SO_4)_2.12H_2O$ 4) $K_2SO_4.Al_2(SO_4)_3.6H_2O$

2. During the preparation of Mohr's salt , dilute H_2SO_4 is added to aqueous solution to

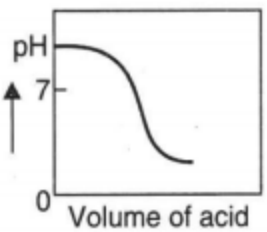
   1) Prevent hydrolysis of SO_4^{2-}

   2) Prevent hydrolysis of Al^{3+}

   3) Prevent hydrolysis of Fe^{3+}

   4) Prevent hydrolysis of Fe^{2+}

3. The plot of pH metric titration of weak base, NH_4OH vs strong acid HCl looks like

1)


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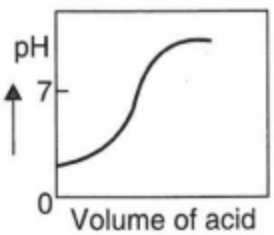

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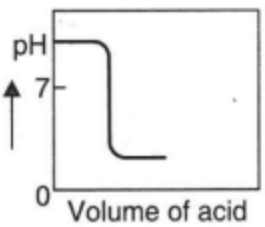

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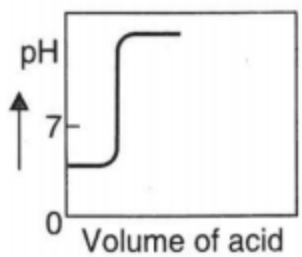


4. Given below are two statements: One is labelled as Assertion (A) and the other is labelled as Reason (R).

Assertion (A) : Phenolphthalein is a pH dependent indicator, remains colourless in acidic solution and gives pink colour in basic medium

Reason (R) : Phenolphthalein is a weak acid. It doesn't dissociate in basic medium

In the light of the above statements, choose the most appropriate answer from the options given below:

1) Both A and R are true and R is the correct explanation of A

2) Both A and R are true and R is not the correct explanation of A

3) A is true and R is false

4) A is false but R is true

5. In base vs. acid titration, at the end point methyl organge is present as

1) Quinonoid form

2) heterocyclic form

3) phenolic form

4) benzenoid form

6. Match the column-I with column-II

Column-I (Metal)	**Column-II (Flame Colouration)**
I) Ba	P) Green with blue centre
II) Ca	Q) Apple green
III) Sr	R) Brick red
IV) Cu	S) Crimson red

1) $I \rightarrow Q;\ II \rightarrow R;\ III \rightarrow S;\ IV \rightarrow P$

2) $I \rightarrow R;\ II \rightarrow Q;\ III \rightarrow S;\ IV \rightarrow P$

3) $I \rightarrow Q;\ II \rightarrow P;\ III \rightarrow S;\ IV \rightarrow R$

4) $I \rightarrow R;\ II \rightarrow Q;\ III \rightarrow P;\ IV \rightarrow S$

7. Which of the following gives a gas with smell of rotten eggs when heated with dil. H_2SO_4 ?

1) CO_3^{2-} 2) SO_3^{2-} 3) S^{2-} 4) NO_2^-

8. Presence of which of the following anions is confirmed by Griss-Ilosvay test?

1) SO_3^{2-} 2) NO_3^- 3) NO_2^- 4) SO_4^{2-}

9. In the chromyl chloride test for chloride ion, the reagent used in the initial step is

1) K_2CrO_4 2) $K_2Cr_2O_7 + con.NaOH$

3) $K_2Cr_2O_7 + con.H_2SO_4$ 4) $(NH_4)_2Cr_2O_7$

10. Copper sulphate is heated with borax in the non-luminous flame. The colour and name of compound formed are

1) Blue-green; Cuprous metaborate

2) Colourless; Cupric metaborate

3) Colourless; Cuprous metaborate

4) Blue-green; Cupric metaborate

11. Match List-I with List-II

List-I (Cation)	**List-II (Group in qualitative analysis)**
I) Cu^{2+}	P) Group-III
II) Fe^{3+}	Q) Group-II A
III) Ba^{2+}	R) Group-II B
IV) Zn^{2+}	S) Group-IV
	T) Group-V

1) $I \rightarrow R;\ II \rightarrow P;\ III \rightarrow T;\ IV \rightarrow S$

2) $I \rightarrow Q;\ II \rightarrow P;\ III \rightarrow T;\ IV \rightarrow S$

3) $I \rightarrow Q;\ II \rightarrow P;\ III \rightarrow S;\ IV \rightarrow T$

4) $I \rightarrow R;\ II \rightarrow S;\ III \rightarrow P;\ IV \rightarrow T$

12. The correct formula of Nessler's reagent is

1) $HgO.Hg(NH_2)I$ 2) K_2HgI_4

3) K_4HgI_4 4) $HgO.Hg(NH_2)_2I$

13. Which of the following is not the correct group reagent for the indicated cation?

1) Pb^{2+} : dil. HCl

2) Ni^{2+} : $NH_4OH + H_2S$

3) Al^{3+} : $NH_4Cl + NH_4OH$

4) Zn^{2+} : dil. $HCl + H_2S$

14. $Al^{3+}, Fe^{3+}, Zn^{2+}$ and Ni^{2+} ions are present in an acidic solution. Excess of ammonium chloride solution is added followed by addition of ammonium hydroxide solution. The precipitate formed will contain

1) $Zn(OH)_2$ & $Ni(OH)_2$

2) $Al(OH)_3$ & $Fe(OH)_3$

3) $Zn(OH)_2$ & $Al(OH)_3$

4) $Ni(OH)_2$ & $Fe(OH)_3$

15. On adding potassium chromate solution to hot $PbCl_2$ solution, a precipitate X is formed which dissolves in hot NaOH due to the formation of compound Y. The colour of X and formula of Y are respectively

1) Yellow, $Na_2[Pb(OH)_4]$
2) Orange, $Na_2[Pb(OH)_4]$
3) Yellow, $PbCrO_4$
4) Orange, $PbCrO_4$

16. When H_2S gas is passed through an acidified aqueous solution containing Cu^{2+} ions, a black precipitate of 'A' is obtained. If 'A' is dissolved in nitric acid and the reaction mixture is heated for a long time, then .....

1) Solution turns blue due to the formation of copper sulphate

2) $Cu(OH)_2.CuSO_4$ precipitates out before the addition of NH_4OH

3) Solution turns blue due to the formation of $[Cu(NH_3)_4]SO_4$

4) White precipitate of sulphur is produced

17. Copper sulphate solution when mixed with potassium ferrocyanide solution gives a precipitate 'M'. Formula and colour of M are

1) $Cu_2[Fe(CN)_6]$, chocolate brown

2) $Cu_4[Fe(CN)_6]$, chocolate brown

3) $Cu_2[Fe(CN)_6]$, flesh coloured

4) $Cu_4[Fe(CN)_6]$, flesh coloured

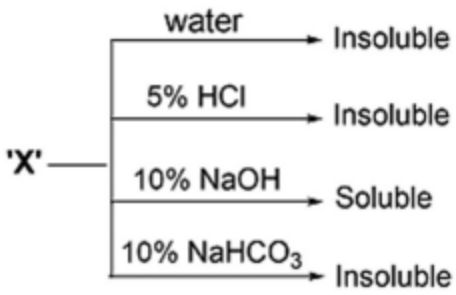
18. A metal chloride 'X' reacts with dimethyl glyoxime in the presence of NH_4OH to form a brilliant red complex 'Y'. The metal ion present in 'X' and the charge on complex 'Y' are respectively

1) Ni^{2+}; +2 2) Mn^{2+}; 0 3) Ni^{2+}; 0 4) Mn^{2+}; +2

19. What is the colour of precipitate formed when potassium ferrocyanide is added to zinc chloride solution?

1) Greenish yellow 2) Bluish white 3) Blood red 4) Greyish white

20. An organic compound (X) showing the following solubility profile is:



1) o-Toluidine 2) Benzoic acid 3) m-Cresol 4) Benzamide

SECTION-II - Numerical Type Questions

21. 25 mL of a mixture of NaOH + Na_2CO_3 when titrated with $\frac{N}{10}HCl$ using phenolphthalein indicator required 25 mL HCl to decolourise phenolphthalein. At this stage methyl orange was added and addition of acid was continued. The second end point was reached after further addtion of 5 mL of the acid. The total number of moles of Na_2CO_3 present in the original sample is ..... $\times 10^{-4}$.

22. Total number of moles of ions produced in aqueous solution on dissolving one mole of Mohr's salt is .....

23. Hydrogen peroxide on reaction with chromate ion in acidic medium gives blue coloured compound A which is stable in amyl alcohol. The total number of peroxide linkages in compound A is .....

24. What is the total number of unpaired electrons on central metal in the brown ring complex formed in the test for nitrate ion?

25. How many of the following compounds are soluble in aqueous $NaHCO_3$?

1) Phenol

2) Cyclohexanol

3) 2,4-Dinitrophenol

4) Benzoic acid

5) Benzenesulphonic acid

6) p-Cresol

7) p-Methoxyphenol

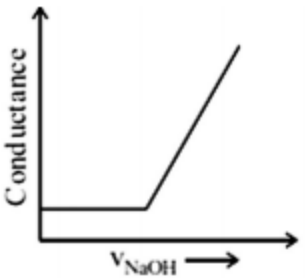
8) α -Naphthol

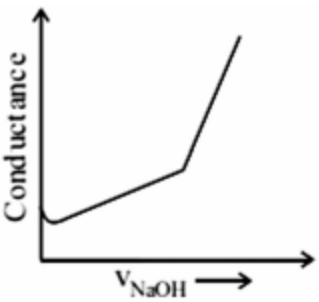
9) N-methylaniline.

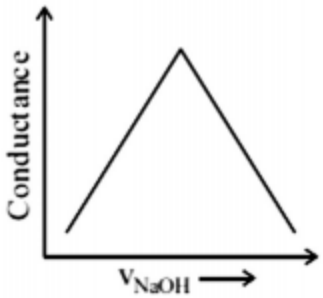
PART-II (JEE ADVANCED)

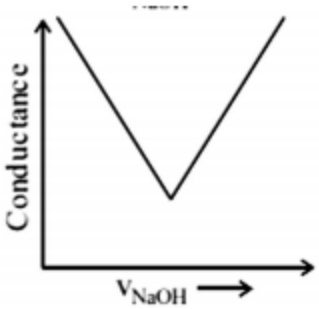
Section-III - Only one option correct type

26. Choose the correct representation of conductometric titration of benzoic acid Vs sodium hydroxide.

A) 

B) 

C) 

D) 

27. A colourless aqueous solution contains nitrates of two metals X and Y. When it was added to an aqueous solution of NaCl, a white precipitate was formed. This precipitate was found to be partially soluble in hot water to give a residue P and a solution Q. The residue P was soluble in aq. NH_3 and also in excess sodium thiosulphate. The hot solution Q gave a yellow precipitate with KI. The metals X and Y, respectively are

A) Ag and Pb B) Ag and Cd C) Cd and Pb D) Cd and Zn

28. The reagent that can selectively precipitate S^{2-} from a mixture of S^{2-} and SO_4^{2-} in aqueous solution is

A) $CuCl_2$ B) $BaCl_2$ C) $Pb(OOCCH_3)_2$ D) $Na_2[Fe(CN)_5NO]$

29. Consider the following observations in an experiment:

$[X]+H_2SO_4 \rightarrow [Y]$ Colourless gas with irritating smell

$[Y]+H_2SO_4+K_2Cr_2O_7 \rightarrow$ Green solution

Anion 'X' and compound 'Y' are respectively

A) SO_3^{2-}, SO_2 B) Cl^-, HCl C) S^{2-}, H_2S D) CO_3^{2-}, CO_2

Passage

A well known orange crystalline compound P when burnt imparts violet colour to flame. P on treating with B and $conc.H_2SO_4$ gives red vapours of C which gives yellow solution D with alkaline water. D on treating with acetic acid and lead acetate gives yellow precipitate E. B sublimes on heating. Also on heating B with NaOH, gas F is formed which gives white fumes with HCl.

30. Compound C would be

A) Br_2 B) I_2 C) CrO_2Cl_2 D) NO_2

31. Yellow solution D is of

A) Na_2CrO_4 B) Cr_2O_3 C) $K_2Cr_2O_7$ D) $Na_2Cr_2O_7$

32. The yellow ppt E is of

A) PbS B) $PbCrO_4$ C) $PbCr_2O_7$ D) $PbSO_4$

33. The compounds P and B are respectively

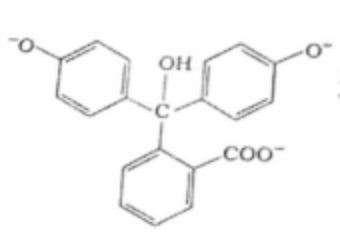
A) $Na_2Cr_2O_7$ and NH_4Cl B) $K_2Cr_2O_7$ and NaCl

C) $K_2Cr_2O_7$ and NH_4Cl D) $Na_2Cr_2O_7$ and NaCl

Section IV - One or more option correct type

34. Which of the following statement(s) is/are correct?

A) In phthalein dye test, a dark pink colour of phenolpthalein with NaOH is due to the formation of



B) In Benedict test for aldehydes, alkaline solution of cuprous ion complexed with citrate ion is used as reagent

C) Phenolphthalein is a good choice of indicator for the titration of a weak base with a strong acid

D) Schiff's reagent is prepared by decolourising aqueous solution of p-rosaniline hydrochloride dye by adding Na_2SO_3 or by passing SO_2 gas

35. Which of the following substances is/are soluble in dilute HNO_3

A) HgS B) CuS C) PbS D) ZnS

36. When disodium hydrogenphosphate is added to the a salt solution of Mg^{2+} in the presence of NH_4OH, it gives

A) A white ppt B) A pink ppt C) $Mg(NH_4)PO_4$ D) $Mg(NH_4)HPO_4$

37. Consider the following reactions (unbalanced)

$$Zn + \text{hot con.}\ H_2SO_4 \rightarrow \underset{(\text{a salt})}{G} + R + X$$

$$G + H_2S + NH_4OH \rightarrow \underset{(\text{a ppt})}{Z} + X + Y$$

Choose the correct option(s)

A) G gives white precipitate with $CaCl_2$ solution

B) Z is brownish black in colour

C) Z is dirty white in colour

D) G gives black precipitate with $Hg(NO_3)_2$ solution

38. A mixture of two salts is used to prepare a solution S, which gives the following results.

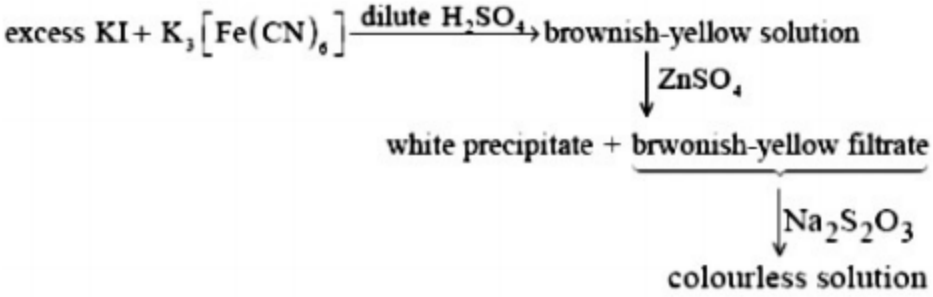
$$\text{White ppt}_{(s)}\ \text{only} \xleftarrow[\text{Room temp.}]{\text{Dil.NaOH}_{(aq)}} \underset{\left(\begin{smallmatrix}\text{Aq.solution}\\ \text{of the salt}\end{smallmatrix}\right)}{S} \xrightarrow[\text{Room temp.}]{\text{Dil. HCl}_{(aq)}} \text{White ppt}_{(s)}\ \text{only}$$

The correct option(s) for the salt mixture is (are)

A) $Pb(NO_3)_2$ and $Zn(NO_3)_2$ B) $Pb(NO_3)_2$ and $AgNO_3$

C) $AgNO_3$ and $Cu(NO_3)_2$ D) $Pb(NO_3)_2$ and $Hg(NO_3)_2$

39. For the given aqueous reaction, which of the statement(s) is(are) true?



A) The first reaction is a redox reaction

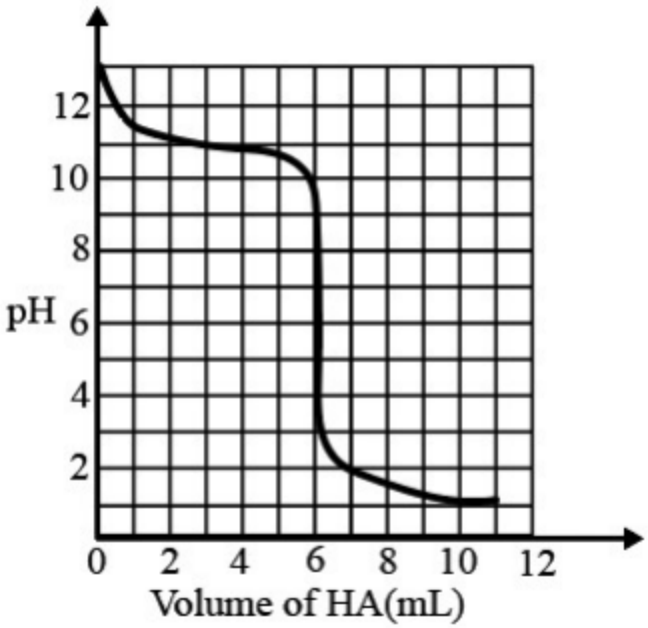
B) White precipitate is $Zn_3[Fe(CN)_6]_2$ and is soluble in NaOH

C) Addition of filtrate to starch solution gives blue colour

D) White precipitate is $K_2Zn_3[Fe(CN)_6]_2$ and is soluble in NaOH

Section V - Numerical type questions

40. A solution of 0.1 M weak base (B) is titrated with 0.1 M of a strong acid (HA). The variation of pH of the solution with the volume of HA added is shown in the figure below. What is the pK_b of the base? The neutralization reaction is given by, $B + HA \rightarrow BH^+ + A^-$



41. How many of the following reagents will not be useful in separating a mixture of Zn^{2+} & Cu^{2+} ?

i) H_2S in acid medium

ii) H_2S in an alkaline medium

iii) Excess of NaOH solution

iv) NH_3 solution

42. When cobalt (II) chloride is dissolved in water, a pink solution A formed. When ammonia is passed through the solution organe red solution is obtained. The co-ordination number of central metal in the organe red solution is .....

43. The green colour produced in the borax bead test of a Chromium (III) salt is due to $Cr_x(BO_y)_z$. The value of x + y - z is .....

44. Among PbS, CuS, HgS, MnS, Ag_2S, NiS, CoS and ZnS, the total number of black coloured sulphides is .....

Section-VI - Matrix match type

45. Match the following

LIST-I	LIST-II
(I) Aniline	(P) Sodium fusion extract of the compound on boiling with $FeSO_4$, followed by acidification with conc. H_2SO_4, gives Prussian blue color.
(II) *o*-Cresol	(Q) Sodium fusion extract of the compound on treatment with sodium nitroprusside gives blood red color.
(III) Cysteine	(R) Addition of the compound to a saturated solution of $NaHCO_3$ results in effervescence.
(IV) Caprolactam	(S) The compound reacts with bromine water to give a white precipitate.
	(T) Treating the compound with neutral $FeCl_3$ solution produces violet color.

A) $I \rightarrow PQ; II \rightarrow S; III \rightarrow QR; IV \rightarrow P$

B) $I \rightarrow P; II \rightarrow RS; III \rightarrow R; IV \rightarrow QS$

C) $I \rightarrow QS; II \rightarrow PT; III \rightarrow P; IV \rightarrow S$

D) $I \rightarrow PS; II \rightarrow T; III \rightarrow QR; IV \rightarrow P$