

27. Chemical Analysis – Multiple Choice Questions

1. Preliminary Test

- The metal that does not give the borax bead test is
 - Cr
 - Ni
 - Na
 - Mn
- Blue borax bead is obtained with
 - Zn
 - Cobalt
 - Chromium
 - Fe
- A colourless gas with the smell of rotten fish is
 - H_2S
 - PH_3
 - SO_2
 - None of these
- Which one of the following cations gives a brick red flame by flame test
 - Ba^{2+}
 - Sr^{2+}
 - Ca^{2+}
 - Zn^{2+}
- Gas A is bubbled through slaked lime when a white precipitate is formed. On prolonged bubbling, the precipitate is dissolved. On heating the resultant solution, the white precipitate reappears with the evolution of gas B. The gases A and B respectively are
 - CO_2 and CO
 - CO and CO_2
 - CO and CO
 - CO_2 and CO_2
- Flame test is not given by
 - Ba^{2+}
 - Be^{2+}
 - Ca^{2+}
 - Sr^{2+}
- The salt used for performing 'bead' test in qualitative inorganic analysis is
 - $K_2SO_4 \cdot Al_2(SO_4)_3 \cdot 24H_2O$
 - $FeSO_4 \cdot (NH_4)_2SO_4 \cdot 6H_2O$
 - $Na(NH_4)HPO_4 \cdot 4H_2O$
 - $CaSO_4 \cdot 2H_2O$
- On performing a borax-bead test with a given inorganic mixture for qualitative analysis, the colour of the bead was found to be emerald green, both in oxidising and reducing flame. It indicates the possibility of the presence of
 - Co^{+2}
 - Ni^{+2}
 - Cr^{+3}
 - Cu^{+2}
- A chemistry student trying to detect the metallic ion in a salt, makes a paste on a clean platinum wire loop of the salt with concentrated HCl. When he takes a small amount of this paste and keeps it in a non-luminous Bunsen flame, the colour of the flame changes to grassy green. He should, therefore, conclude that the metal is
 - Barium
 - Calcium
 - Potassium
 - Strontium
- Which gives violet coloured bead in borax bead test
 - Fe^{2+}
 - Ni^{2+}
 - Co^{2+}
 - Mn^{2+}
- Which of the following imparts green colour to the burner flame
 - $B(OMe)_3$
 - $Na(OMe)$
 - $Al(OPr)_3$
 - $Sn(OH)_2$
- The colour of the borax bead is due to the formation of a/an
 - Glass like metal metaborate bead
 - Hard boric oxide crystal
 - Opaque metal hexaborate bead
 - Glass-like metal orthoborate bead
- The colour of $CuCr_2O_7$ solution in water is green because
 - $Cr_2O_7^{2-}$ ions are green
 - Cu^{++} ions are green
 - Both ions are green
 - Cu^{++} ions are blue and $Cr_2O_7^{2-}$ ions are yellow

2. Wet Test for Acid Radical

- A salt is heated first with dil. H_2SO_4 and then with conc. H_2SO_4 . No reaction takes place. It may be
 - Nitrate
 - Sulphide
 - Oxalate
 - Sulphate
- Nitrates of all the metals are
 - Coloured
 - Unstable
 - Soluble in water
 - Insoluble in water
- Nitrate is confirmed by ring test. The brown colour of the ring is due to the formation of
 - Ferrous nitrite
 - $FeSO_4 \cdot NO$
 - $FeSO_4 \cdot NO_2$
 - Ferrous nitrate

4. Chromyl chloride test is performed for the confirmation of the presence of the following in a mixture
- (a) Sulphate (b) Chromium
(c) Chloride (d) Chromium and chloride
5. Which of the following doesn't give a ppt. with silver nitrate solution
- (a) Ethyl bromide (b) Sodium bromide
(c) Calcium chloride (d) Sodium chloride
6. Br_2 gas turns starch iodide paper
- (a) Blue (b) Red
(c) Colourless (d) Yellow
7. Chromyl chloride vapours are dissolved in $NaOH$ and acetic acid and lead acetate solution is added, then
- (a) The solution will remain colourless
(b) The solution will become dark green
(c) A yellow solution will be obtained
(d) A yellow precipitate will be obtained
8. Which reagent is used to remove SO_4^{2-} and Cl^-
- (a) $BaSO_4$ (b) $NaOH$
(c) $Pb(NO_3)_2$ (d) KOH

9. Compound X is tested and the results are shown in the table

Text		Result	
*	Aqueous sodium hydroxide is added, then heated gently.	*	Gas given off which turns damp red litmus paper blue.
*	Dilute hydro chloric acid is added.	*	Effervescence, gas given off which turns lime water milky and acidified $K_2Cr_2O_7$ paper green.

Which ions are present in compound X

- (a) Ammonium ions and sulphite ions
(b) Ammonium ions and carbonate ions
(c) Sodium ions and carbonate ions
(d) Ammonium ions and sulphate ions
10. A solution of a salt in dilute sulphuric acid imparts deep blue colour with starch iodine solution it confirms the presence of which of the following
- (a) NO_2^- (b) I^-
(c) NO_3^- (d) CH_3COO^-

11. When H_2S gas is passed through a hot acidic aqueous solution containing Al^{3+} , Cu^{2+} , Pb^{2+} and Ni^{2+} , a precipitate is formed which consists of
- (a) CuS and Al_2S_3 (b) PbS and NiS .
(c) CuS and NiS (d) PbS and CuS

3. Wet Test for Basic Radical

1. Distinguishing reagent between silver and lead salts is
- (a) H_2S gas
(b) Hot dilute HCl solution
(c) NH_4Cl (solid) + NH_4OH solution
(d) NH_4Cl (solid) + $(NH_4)_2CO_3$ solution
2. Which one of the following sulphides is yellow
- (a) Zinc sulphide (b) Cadmium sulphide
(c) Nickel sulphide (d) Lead sulphide
3. What product is formed by mixing the solution of $K_4[Fe(CN)_6]$ with the solution of $FeCl_3$
- (a) Ferro-ferricyanide (b) Ferri-ferrocyanide
(c) Ferri-ferricyanide (d) None of these
4. When H_2S is passed through a mixture containing Cu^{+2} , Ni^{+2} , Zn^{+2} in acidic solution then ion will precipitate
- (a) Cu^{+2} , Ni^{+2} (b) Ni^{+2}
(c) Cu^{+2} , Zn^{+2} (d) Cu^{+2}
5. Which of the following sulphate is insoluble in water
- (a) $CuSO_4$ (b) $CdSO_4$
(c) $PbSO_4$ (d) $Bi_2(SO_4)_3$
6. Out of Cu^{2+} , Ni^{2+} , Co^{2+} and Mn^{2+} those dissolves in dil. HCl , only one gives a precipitate when H_2S is passed. Identify the corresponding one
- (a) Ni^{2+} (b) Cu^{2+}
(c) Co^{2+} (d) Mn^{2+}
7. Addition of $SnCl_2$ to $HgCl_2$ gives ppt
- (a) White turning to red (b) White turning to grey
(c) Black turning to white (d) None of these
8. In Nessler's reagent for the detection of ammonia the active species is
- (a) Hg_2Cl_2 (b) Hg^{2+}
(c) Hg_2I_2 (d) HgI_4^{2-}

9. Nessler's reagent is
 (a) K_2HgI_4 (b) $K_2HgI_4 + KOH$
 (c) $K_2HgI_2 + KOH$ (d) $K_2HgI_4 + Hg$
10. Mark the correct statement
 (a) I group basic radicals precipitate as chlorides
 (b) IV group basic radicals precipitate as sulphides
 (c) V group basic radicals precipitate as carbonates
 (d) All of these statements are correct
11. The following four solutions are kept in separate beakers and copper metal is put in each of them. Which solution will become blue after sometime
 (a) $AgNO_3$ solution (b) $Zn(NO_3)_2$ solution
 (c) $Ba(NO_3)_2$ solution (d) $NaNO_3$ solution
12. Which mixture is separated by conc. aqueous solution of sodium hydroxide
 (a) Al^{3+} and Sn^{2+} (b) Al^{3+} and Fe^{3+}
 (c) Al^{3+} and Zn^{2+} (d) Zn^{2+} and Pb^{2+}
13. A chloride dissolves appreciably in cold water. When placed on a platinum wire in Bunsen flame, no distinctive colour is noted, which cation could be present
 (a) Be^{2+} (b) Ba^{2+}
 (c) Pb^{2+} (d) Ca^{2+}
14. A solid (A) which has photographic effect, reacts with the solution of a sodium salt (B) to give a pale yellow ppt. (C). Sodium salt on heating gives brown vapour. Identify A, B and C.
 (a) $AgNO_3, NaBr, AgBr$ (b) $AgNO_3, NaCl, AgCl_2$
 (c) $AgNO_3, NaBr, AgCl_2$ (d) $AgCl, NaBr, AgBr_2$
15. In qualitative analysis, in order to detect second group basic radical, H_2S gas is passed in the presence of dilute HCl to
 (a) Increase in dissociation of H_2S
 (b) Decrease the dissociation of salt solution
 (c) Decrease the dissociation of H_2S
 (d) Increase the dissociation of salt solution
16. A white solid 'A' on heating gives off a gas which turns lime water milky. The residue is yellow when hot but turns white on cooling. This solid 'A' is
 (a) Zinc sulphate (b) Zinc carbonate
 (c) Lead sulphate (d) Lead carbonate
17. A salt on treatment with dil. HCl gives a pungent smelling gas and a yellow precipitate. The salt gives green flame when tested. The salt solution gives a yellow precipitate with potassium chromate. The salt is
 (a) $NiSO_4$ (b) BaS_2O_3
 (c) PbS_2O_3 (d) $CuSO_4$
18. Neutral ferric chloride is added to the aqueous solution of acetate. The blood red colour is obtained, it is due to the compound
 (a) $Fe(OH)_2$ (b) $Fe(OH)_3$
 (c) $Fe(CH_3COO)_3$ (d) $Fe(OH)_2(CH_3COO)$
19. H_2S will precipitate the sulphides of all the metals from the solution of chlorides of Cu, Zn and Cd , if
 (a) The solution is aqueous
 (b) The solution is acidic
 (c) The solution is dilute acidic
 (d) Any of these solutions is present
20. Addition of solution of oxalate to an aqueous solution of mixture of Ba^{++}, Sr^{++} and Ca^{++} will precipitate
 (a) Ca^{++} (b) Ca^{++} and Sr^{++}
 (c) Ba^{++} and Sr^{++} (d) All the three
21. In analysis of third group cations of mixture analysis, solid NH_4Cl is added prior to NH_4OH for the following
 (a) Availability of Cl^- ions
 (b) Availability of NH_4^+ ions
 (c) Complete dissociation of NH_4OH
 (d) Controlled dissociation of NH_4OH
22. $Al^{3+}, Fe^{3+}, Zn^{2+}$ 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 available precipitate will contain
 (a) $Zn(OH)_2$ and $Ni(OH)_2$ (b) $Al(OH)_3$ and $Fe(OH)_3$
 (c) $Zn(OH)_2$ and $Al(OH)_3$ (d) $Ni(OH)_2$ and $Fe(OH)_3$
23. Which of the following gives a ppt. with $Pb(NO_3)_2$ but not with $Ba(NO_3)_2$
 (a) $NaCl$
 (b) Sodium acetate
 (c) Sodium nitrate
 (d) Sodium hydrogen phosphate

24. A solution when treated with dimethyl glyoxime gives a rose red complex. The metal present is

- (a) Ni (b) V
(c) Co (d) Mn

25. When dilute aqueous solution of AgNO_3 (excess) is added to KI solution, positively charged solution particles of AgI are formed due to adsorption of ion

- (a) NO_3^- (b) O_2^-
(c) Ag^+ (d) K^+

26. A colourless crystalline salt 'X' is soluble in dilute HCl . On adding NaOH solution, it gives a white precipitate which is insoluble in excess of NaOH . 'X' is

- (a) $\text{Al}_2(\text{SO}_4)_3$ (b) ZnSO_4
(c) MgSO_4 (d) SnCl_2

27. The best explanation for the solubility of MnS in dil. HCl is that

- (a) Solubility product of MnCl_2 is less than that of MnS
(b) Concentration of Mn^{2+} is lowered by the formation of complex ions with chloride ions
(c) Concentration of sulphide ions is lowered by oxidation to free sulphur
(d) Concentration of sulphide ions is lowered by formation of the weak acid H_2S

28. A white crystalline substance dissolves in water. On passing H_2S in this solution, a black precipitate is obtained. The black precipitate dissolves completely in hot HNO_3 . On adding a few drops of conc. H_2SO_4 a white precipitate is obtained. This precipitate is that of

- (a) BaSO_4 (b) SrSO_4
(c) PbSO_4 (d) CdSO_4

29. Which of the following compounds, on reaction with NaOH and Na_2O_2 , gives yellow colour

- (a) $\text{Zn}(\text{OH})_2$ (b) $\text{Al}(\text{OH})_3$
(c) $\text{Cr}(\text{OH})_3$ (d) CaCO_3

30. Which of the following compounds is brown coloured

- (a) $\text{Fe}[\text{Fe}(\text{CN})_4]$ (b) $\text{Fe}[\text{Fe}(\text{CN})_6]$
(c) $\text{Fe}_4[\text{Fe}(\text{CN})_6]$ (d) $\text{K}_2\text{Fe}[\text{Fe}(\text{CN})_6]$

31. Which one of the following sulphides is only completely precipitated when the acidic solution is made dilute

- (a) HgS (b) PbS
(c) CdS (d) CuS

32. A white crystalline salt [A] reacts with dilute HCl to liberate a suffocating gas [B] and also forms a yellow precipitate. The gas [B] turns potassium dichromate acidified with dilute H_2SO_4 to a green coloured solution [C]. A, B and C are respectively

- (a) $\text{Na}_2\text{SO}_3, \text{SO}_2, \text{Cr}_2(\text{SO}_4)_3$
(b) $\text{Na}_2\text{S}_2\text{O}_3, \text{SO}_2, \text{Cr}_2(\text{SO}_4)_3$
(c) $\text{Na}_2\text{S}, \text{SO}_2, \text{Cr}_2(\text{SO}_4)_3$
(d) $\text{Na}_2\text{SO}_4, \text{SO}_2, \text{Cr}_2(\text{SO}_4)_3$

33. Addition of sodium thiosulphate solution to a solution of silver nitrate gives 'X' as white precipitate, insoluble in water but soluble in excess thiosulphate solution to give 'Y'. On boiling in water, 'Y' gives 'Z'. 'X', 'Y' and 'Z' respectively, are

- (a) $\text{Ag}_2\text{S}_2\text{O}_3, \text{Na}_3[\text{Ag}(\text{S}_2\text{O}_3)_2], \text{Ag}_2\text{S}$
(b) $\text{Ag}_2\text{SO}_4, \text{Na}[\text{Ag}(\text{S}_2\text{O}_3)_2], \text{Ag}_2\text{S}_2$
(c) $\text{Ag}_2\text{S}_2\text{O}_3, \text{Na}_5[\text{Ag}(\text{S}_2\text{O}_3)_3], \text{AgS}$
(d) $\text{Ag}_2\text{SO}_3, \text{Na}_3[\text{Ag}(\text{S}_2\text{O}_3)_2], \text{Ag}_2\text{O}$

4. Volumetric Analysis

1. A 100 mL solution of 0.1 N - HCl was titrated with 0.2 N - NaOH solution. The titration was discontinued after adding 30 mL of NaOH solution. The remaining titration was completed by adding 0.25 N - KOH solution. The volume of KOH required for completing the titration is

- (a) 16 mL (b) 32 mL
(c) 35 mL (d) 70 mL

2. The ratio of amounts of H_2S needed to precipitate all the metal ions from 100 mL of 1 M AgNO_3 and 100 mL of 1 M CuSO_4 is

- (a) 1 : 2 (b) 2 : 1
(c) Zero (d) Infinity

3. Phosphoric acid (H_3PO_4) is tribasic acid and one of its salt is sodium dihydrogen phosphate (NaH_2PO_4). What volume of 1 M NaOH solution should be added to 12 g of sodium dihydrogen phosphate (mol. wt. 120) to exactly convert it into trisodium phosphate Na_3PO_4

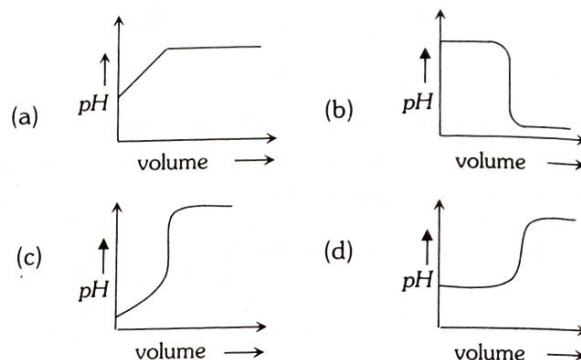
- (a) 80 mL (b) 100 mL
(c) 200 mL (d) 300 mL

4. A solution containing Na_2CO_3 and NaOH requires 300 mL of 0.1 N HCl using phenolphthalein as an indicator. Methyl orange is then added to above titrated solution when a further 25 mL of 0.2 N HCl is required. The amount of NaOH present in the original solution is

- (a) 0.5 g (b) 1 g
(c) 2 g (d) 4 g

5. Phenolphthalein is most suitable indicator for the titration of
 (a) CH_3COOH and NH_4OH (b) CH_3COOH and NaOH
 (c) HCl and NH_4OH (d) H_2CO_3 and NH_4OH
6. Acidic solution of $\text{S}_2\text{O}_3^{2-}$ is converted to in presence of I_2
 (a) $\text{S}_4\text{O}_6^{2-} + \text{I}^-$ (b) $\text{SO}_4^{2-} + \text{I}^-$
 (c) $\text{SO}_3 + \text{I}^-$ (d) $\text{S}_4\text{O}_6^{2-} + \text{I}_3^-$
7. Methyl orange gives red colour in
 (a) Sodium carbonate solution
 (b) Sodium chloride solution
 (c) Hydrochloric acid solution
 (d) Potassium hydroxide solution
8. A 0.1 N solution of Na_2CO_3 is titrated with 0.1 N HCl solution. The best indicator to be used is
 (a) Potassium ferricyanide (b) Phenolphthalein
 (c) Methyl red (d) Litmus paper
9. In the reaction $\text{I}_2 + 2\text{S}_2\text{O}_3^{2-} \rightarrow 2\text{I}^- + \text{S}_4\text{O}_6^{2-}$; the equivalent weight of iodine will be equal to
 (a) Molecular weight
 (b) $1/2$ the molecular weight
 (c) $1/4$ the molecular weight
 (d) Twice the molecular weight
10. When a standard solution of NaOH is left in the air for a few hours
 (a) A precipitate will form
 (b) Strength will decrease
 (c) The concentration of Na^+ ions will decrease
 (d) All are wrong
11. Out of the following the one which is not a primary standard is
 (a) $\text{K}_2\text{Cr}_2\text{O}_7$ (b) KMnO_4
 (c) Oxalic acid (d) Ceric sulphate
12. Phenolphthalein is not a good indicator for titrating
 (a) NaOH against oxalic acid
 (b) Ferrous sulphate against KMnO_4
 (c) NaOH against HCl
 (d) NaOH against H_2SO_4
13. Which is the best choice for weak base– strong acid titration
 (a) Methyl red (b) Litmus
 (c) Phenol red (d) Phenolphthalein

14. Which of the following plot represents the graph of pH against volume of alkali added in the titration of NaOH and HCl

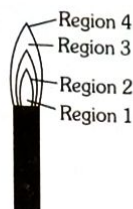


15. Phenolphthalein is not suitable for the titration of
 (a) NaOH vs $(\text{COOH})_2$ (b) KOH vs H_2SO_4
 (c) K_2CO_3 vs HCl (d) None of these
16. Indicator for the titration of HCl and Na_2CO_3 would be
 (a) $\text{K}_4\text{Fe}(\text{CN})_6$ (b) $\text{K}_3\text{Fe}(\text{CN})_6$
 (c) Phenolphthalein (d) Methyl orange
17. The pink colour of phenolphthalein in alkaline medium is
 (a) Due to negative form (b) Due to positive form
 (c) Due to OH^- ions (d) Due to neutral form
18. In the iodometric estimation in laboratory, which process is involved
 (a) $\text{Cr}_2\text{O}_7^{2-} + \text{H}^+ + \text{I}^- \rightarrow 2\text{Cr}^{3+} + \text{I}_2$,
 $\text{I}_2 + \text{S}_2\text{O}_3^{2-} \rightarrow \text{S}_4\text{O}_6^{2-} + \text{I}^-$
 (b) $\text{MnO}_4^- + \text{H}^+ + \text{I}^- \rightarrow \text{MnO}_2 + \text{I}_2$
 $\text{I}_2 + \text{S}_2\text{O}_3^{2-} \rightarrow \text{S}_4\text{O}_6^{2-} + \text{I}^-$
 (c) $\text{MnO}_4^- + \text{OH}^- + \text{I}^- \rightarrow \text{MnO}_2 + \text{I}_2$
 $\text{I}_2 + \text{S}_2\text{O}_3^{2-} \rightarrow \text{S}_4\text{O}_6^{2-} + \text{I}^-$
 (d) $\text{Cr}_2\text{O}_7^{2-} + \text{OH}^- + \text{I}^- \rightarrow 2\text{Cr}^{3+} + \text{I}_2$
 $\text{I}_2 + \text{S}_2\text{O}_3^{2-} \rightarrow \text{S}_4\text{O}_6^{2-} + \text{I}^-$
19. Ca^{2+} and Mg^{2+} ions in the hard water are estimated by simple titration with
 (a) Na_2EDTA (b) NaEDTA
 (c) Na_3EDTA (d) Na_4EDTA

5. IIT-JEE/ AIEEE

1. When concentrated H_2SO_4 is added to dry KNO_3 , brown fumes evolve. These fumes are [1987]
 (a) SO_2 (b) SO_3
 (c) NO (d) NO_2

2. The hottest region of Bunsen flame shown in the figure below is [2016]



- (a) Region 2 (b) Region 3
(c) Region 4 (d) Region 1
3. Which BLUE LIQUID is obtained on reacting equimolar amounts of two gases at -30°C [2005]

- (a) N_2O (b) N_2O_3
(c) N_2O_4 (d) N_2O_5

4. Which one of the following anions is not easily removed from aqueous solutions by precipitation [1995]

- (a) Cl^- (b) NO_3^-
(c) CO_3^{2-} (d) SO_4^{2-}

5. Sodium nitroprusside, when added to an alkaline solution of sulphide ions, produces purple colour ion due to the formation of [1995]

- (a) $\text{Na}[\text{Fe}(\text{H}_2\text{O})_5\text{NOS}]$ (b) $\text{Na}_2[\text{Fe}(\text{H}_2\text{O})_5\text{NOS}]$
(c) $\text{Na}_3[\text{Fe}(\text{CN})_5\text{NOS}]$ (d) $\text{Na}_4[\text{Fe}(\text{CN})_5\text{NOS}]$

6. A substance on treatment with dil H_2SO_4 liberates a colourless gas which produces (i) turbidity with baryta water and (ii) turns acidified dichromate solution green. The reaction indicates the presence of [1992]

- (a) CO_3^{2-} (b) S^{2-}
(c) SO_3^{2-} (d) NO_2^-

7. A black sulphide is formed by the action of H_2S on [1978]

- (a) Cupric chloride (b) Cadmium chloride
(c) Zinc chloride (d) Sodium chloride

8. The reagents NH_4Cl and aqueous NH_3 will precipitate [1991]

- (a) Ca^{2+} (b) Al^{+3}
(c) Mg^{2+} (d) Zn^{2+}

9. The aqueous solutions of the following salts will be coloured in the case of [1990]

- (a) $\text{Zn}(\text{NO}_3)_2$ (b) LiNO_3
(c) CrCl_3 (d) Potash alum

10. MgSO_4 on reaction with NH_4OH and Na_2HPO_4 forms a white crystalline precipitate. What is its formula [2006]

- (a) $\text{Mg}(\text{NH}_4)\text{PO}_4$ (b) $\text{Mg}_3(\text{PO}_4)_2$
(c) $\text{MgCl}_2, \text{MgSO}_4$ (d) MgSO_4

11. A red solid is insoluble in water. However, it becomes soluble if some KI is added to water. Heating the red solid in a test tube results in liberation of some violet coloured fumes and droplets of a metal appear on the cooler parts of the test tube. The red solid is [2003]

- (a) $(\text{NH}_4)_2\text{Cr}_2\text{O}_7$ (b) HgI_2
(c) HgO (d) Pb_3O_4

12. A solution of a metal ion when treated with KI gives a red precipitate which dissolves in excess KI to give a colourless solution. Moreover, the solution of metal ion on treatment with a solution of cobalt(II) thiocyanate gives rise to a deep blue crystalline precipitate. The metal ion is [2007]

- (a) Pb^{2+} (b) Hg^{2+}
(c) Cu^{2+} (d) Co^{2+}

13. How do we differentiate between Fe^{3+} and Cr^{3+} in group III [2002]

- (a) By taking excess of NH_4OH solution
(b) By increasing NH_4^+ ion concentration
(c) By decreasing OH^- ion concentration
(d) Both (b) and (c)

14. $[\text{X}] + \text{H}_2\text{SO}_4 \rightarrow [\text{Y}]$ a colourless gas with irritating smell



$[\text{X}]$ and $[\text{Y}]$ is [2003]

- (a) $\text{SO}_3^{2-}, \text{SO}_2$ (b) Cl^-, HCl
(c) $\text{S}^{2-}, \text{H}_2\text{S}$ (d) $\text{CO}_3^{2-}, \text{CO}_2$

15. An aqueous solution contains the ions as Hg_2^{2+} , Hg^{2+} , Pb^{2+} and Cd^{2+} . The addition of dilute $\text{HCl}(6\text{N})$ precipitates [1995]

- (a) Hg_2Cl_2 only (b) PbCl_2 only
(c) PbCl_2 and HgCl_2 (d) Hg_2Cl_2 and PbCl_2

16. Which compound does not dissolve in hot dilute HNO_3 [1996]

- (a) HgS (b) PbS
(c) CuS (d) CdS

17. Which one among the following pairs of ions cannot be separated by H_2S in dilute hydrochloric acid [1986]

- (a) $\text{Bi}^{3+}, \text{Sn}^{4+}$ (b) $\text{Al}^{3+}, \text{Hg}^{2+}$
(c) $\text{Zn}^{2+}, \text{Cu}^{2+}$ (d) $\text{Ni}^{2+}, \text{Cu}^{2+}$

18. The ion that cannot be precipitated by both HCl and H_2S is [1982]
 (a) Pb^{2+} (b) Cu^+
 (c) Ag^+ (d) Sn^{2+}
19. When H_2S is passed through Hg_2S we get [2002]
 (a) HgS (b) $HgS + Hg_2S$
 (c) $Hg_2S + Hg$ (d) Hg_2S
20. A metal nitrate reacts with KI to give a black precipitate which on addition of excess of KI convert into orange colour solution. The cation of the metal nitrate is [2005]
 (a) Hg^{2+} (b) Bi^{3+}
 (c) Pb^{2+} (d) Cu^+
21. A solution when diluted with H_2O and boiled, it gives a white precipitate. On addition of excess NH_4Cl/NH_4OH the volume of precipitate decreases leaving behind a white gelatinous precipitate. Identify the precipitate which dissolves in NH_4OH/NH_4Cl [2006]
 (a) $Zn(OH)_2$ (b) $Al(OH)_3$
 (c) $Mg(OH)_2$ (d) $Ca(OH)_2$
22. An aqueous solution of $FeSO_4$, $Al_2(SO_4)_3$ and chrome alum is heated with excess of Na_2O_2 and filtered. The materials obtained are [1996]
 (a) A colourless filtrate and a green residue
 (b) A yellow filtrate and a green residue
 (c) A yellow filtrate and a brown residue
 (d) A green filtrate and a brown residue
23. The indicator used in titrating weak acid (e.g. oxalic acid) with a strong base (e.g. caustic soda) solution is [1985]
 (a) Methyl orange (b) Methyl red
 (c) Fluorescein (d) Phenolphthalein
24. Amount of oxalic acid present in a solution can be determined by its titration with $KMnO_4$ solution in the presence of H_2SO_4 . The titration gives unsatisfactory results when carried out in the presence of HCl , because HCl [2008]
 (a) Furnishes H^+ ions in addition to those from oxalic acid
 (b) Reduces permanganate to Mn^{2+}
 (c) Oxidises oxalic acid to carbon dioxide and water
 (d) Get oxidised by oxalic acid to chlorine
25. In the standardization of $Na_2S_2O_3$ using $K_2Cr_2O_7$ by iodometry, the equivalent weight of $K_2Cr_2O_7$ is [2001]
 (a) (Molecular weight)/2 (b) (Molecular weight)/6
 (c) (Molecular weight)/3 (d) Same as molecular weight

6. NEET/ AIPMT/ CBSE-PMT

1. In borax bead test, which of the following compound is formed [2002]
 (a) Meta borate (b) Tetra borate
 (c) Double oxide (d) Ortho borate
2. Which of the following combines with $Fe(II)$ ions to form a brown complex [2000]
 (a) N_2O (b) NO
 (c) N_2O_3 (d) N_2O_5
3. When H_2S gas is passed into a certain solution, it reacts to form a white precipitate. The solution referred to contains ions of [1990]
 (a) Lead (b) Zinc
 (c) Copper (d) Nickel
4. H_2S gas when passed through a solution of containing HCl , precipitate the cations of group II in qualitative analysis but not those belonging to the fourth group. It is because [2005]
 (a) Presence of HCl decreases the sulphide ion concentration
 (b) Presence of HCl increases the sulphide ion concentration
 (c) Solubility product of group II sulphides is more than that of group IV sulphides
 (d) Sulphides of group IV Cations are in HCl
5. The composition of 'Golden spangles' is [1990]
 (a) $PbCrO_4$ (b) PbI_2
 (c) As_2S_3 (d) $BaCrO_4$
6. Which indicator can be used in the titration of strong acid and strong base [1988]
 (a) Only phenolphthalein (b) Only methyl orange
 (c) Either of the two (d) Red litmus
7. If we use phenolphthalein as an indicator in a titration of Na_2CO_3 with HCl , the usual result is [1989]
 (a) No visible change occur
 (b) The indicator reacts with the acid
 (c) The indicator reacts with the base
 (d) Sodium chloride and carbonic acid will be formed

7. AIIMS

- S^{2-} and SO_3^{2-} can be distinguished by using [2008]
 - $(CH_3COO)_2Pb$
 - $Na_2[Fe(CN)_5NO]$
 - Both (a) and (b)
 - None of these
- Sometimes yellow turbidity appears on passing H_2S gas even in the absence of the second group radicals. This happens because [1982]
 - Sulphur is present in the mixture as an impurity
 - The fourth group radicals are precipitated as sulphides
 - The H_2S is oxidized by some acid radicals
 - The third group radicals are precipitated
- In the precipitation of the iron group in qualitative analysis, ammonium chloride is added before adding ammonium hydroxide to [1980]
 - Decrease concentration of OH^- ions
 - Prevent interference by phosphate ions
 - Increase concentration of Cl^- ions
 - Increase concentration of NH_4^+ ions
- Nessler's reagent is used to detect [1997]
 - CrO_4^{2-}
 - PO_4^{3-}
 - MnO_4^-
 - NH_4^+
- Cu^{2+} ions will be reduced to Cu^+ ions by the addition of an aqueous solution of [1992]
 - KF
 - KCl
 - KI
 - KOH
- Which of the following reactions with H_2S does not produce metallic sulphide [1997]
 - $ZnCl_2$
 - $CdCl_2$
 - $CoCl_2$
 - $CuCl_2$
- With $K_4[Fe(CN)_6]$, Cu^{2+} ion gives [2007]
 - A blue ppt
 - A bluish green ppt
 - A blood red ppt
 - A reddish brown ppt
- When H_2S gas is passed through the HCl containing aqueous solutions of $CuCl_2$, $HgCl_2$, $BiCl_3$ and $CoCl_2$, which does not precipitate out [2007]
 - CuS
 - HgS
 - Bi_2S_3
 - CoS
- In fifth group, $(NH_4)_2CO_3$ is added to precipitate out the carbonates. We do not add Na_2CO_3 because [1980, 82]
 - $CaCO_3$ is soluble in Na_2CO_3

(b) Na_2CO_3 increases the solubility of fifth group carbonates

(c) $MgCO_3$ will be precipitated out in fifth group

(d) None of these

10. In the group III radicals, in place of NH_4Cl which of the following can be used [1980, 82]

(a) NH_4NO_3

(b) $(NH_4)_2SO_4$

(c) $(NH_4)_2CO_3$

(d) $NaCl$

11. Which of the following cannot give iodometric titrations [1997]

(a) Fe^{3+}

(b) Cu^{2+}

(c) Pb^{2+}

(d) Ag^{2+}

12. When $KMnO_4$ solution is titrated with a solution containing Fe^{2+} ion, the indicator used in this titration is [1996]

(a) Phenolphthalein

(b) Methyl orange

(c) $K_3[Fe(CN)_6]$

(d) None of these

8. Assertion and Reason

Read the assertion and reason carefully to mark the correct option out of the options given below :

- If both assertion and reason are true and the reason is the correct explanation of the assertion.
- If both assertion and reason are true but reason is not the correct explanation of the assertion.
- If assertion is true but reason is false.
- If the assertion and reason both are false.
- If assertion is false but reason is true.

1. Assertion : Lime water becomes turbid on passing CO_2 but becomes clear on passing more CO_2 .

Reason : Lime water is calcium hydroxide, $Ca(OH)_2$.

[AIIMS 2000]

2. Assertion : $Sb(III)$ is not precipitated as sulphide when in its alkaline solution H_2S is passed.

Reason : The concentration of S^{2-} ion in alkaline medium is inadequate for precipitation.

[AIIMS 2004]

3. Assertion : Cu^{2+} and Cd^{2+} are separated by first adding KCN solution and then passing H_2S gas.

Reason : KCN reduces Cu^{2+} to Cu^+ and form a complex with it.

[AIIMS 2007]

4. Assertion : A solution of BiCl_3 in conc. HCl when diluted with water gives white ppt.

Reason : BiCl_3 is insoluble in dil. HCl .

5. Assertion : Addition of NH_4OH to an aqueous solution of BaCl_2 in the presence of NH_4Cl (excess) precipitates $\text{Ba}(\text{OH})_2$.

Reason : $\text{Ba}(\text{OH})_2$ is insoluble in water.

[AIIMS 2005]

6. Assertion : $\text{K}_2\text{Cr}_2\text{O}_7$ is used as a primary standard in volumetric analysis.

Reason : It has a good solubility in water.

[AIIMS 2006]

7. Assertion : Change in colour of acidic solution of potassium dichromate by breath is used to test drunk drivers.

Reason : Change in colour is due to the complexation of alcohol with potassium dichromate.

[AIIMS 2006]

8. Assertion : $\text{Na}_2\text{Cr}_2\text{O}_7$ is not a primary standard in volumetric analysis.

Reason : $\text{Na}_2\text{Cr}_2\text{O}_7$ is hygroscopic.

9. Assertion : Borax bead test is not suitable for $\text{Al}(\text{III})$.

Reason : Al_2O_3 is insoluble in water.

[AIIMS 2005]

27. Chemical Analysis – Answers Keys

1. Preliminary Test

1	c	2	b	3	b	4	c	5	d
6	b	7	c	8	c	9	a	10	d
11	a	12	a	13	d				

2. Wet Test for Acid Radical

1	d	2	c	3	b	4	c	5	a
6	a	7	d	8	c	9	a	10	a
11	d								

3. Wet Test for Basic Radical

1	b	2	b	3	b	4	d	5	d
6	b	7	b	8	d	9	b	10	d
11	a	12	b	13	a	14	a	15	c
16	b	17	b	18	c	19	c	20	d
21	d	22	b	23	a	24	a	25	c
26	c	27	d	28	c	29	c	30	b
31	c	32	b	33	a				

4. Volumetric Analysis

1	a	2	a	3	c	4	b	5	b
6	a	7	c	8	c	9	b	10	b
11	b	12	b	13	a	14	c	15	d
16	d	17	a	18	a	19	d		

5. IIT-JEE/ AIEEE

1	d	2	a	3	b	4	b	5	d
6	c	7	a	8	b	9	c	10	a
11	b	12	b	13	d	14	c	15	d
16	a	17	a	18	d	19	c	20	b

21	a	22	b	23	d	24	b	25	b
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6. NEET/ AIPMT/ CBSE-PMT

1	a	2	b	3	b	4	a	5	b
6	c	7	a						

7. AIIMS

1	c	2	b	3	a	4	d	5	c
6	c	7	d	8	d	9	c	10	a
11	c	12	d						

8. Assertion & Reason

1	b	2	c	3	b	4	b	5	d
6	c	7	c	8	a	9	b		