

EXERCISE-01

CHECK YOUR GRASP

SELECT THE CORRECT ALTERNATIVE (ONLY ONE CORRECT ANSWER)

1. A white crystalline solid A on boiling with caustic soda solution gave a gas B which when passed through an alkaline solution of potassium mercuric iodide gave a brown ppt. The substance A on heating gave a gas C which rekindled a glowing splinter but did not give brown fumes with nitric oxide. The gas B is ?
(A) H_2S (B) NH_3 (C) HCl (D) CO_2
2. The gas C (in the above question) is -
(A) N_2O (B) O_2 (C) NO (D) O_3
3. A metal oxide is yellow when hot and white when cold. The metal oxide is -
(A) ZnO (B) CuO (C) PbO (D) Al_2O_3
4. When a salt is heated with dil. H_2SO_4 and KMnO_4 solution, the pink colour of KMnO_4 is discharged, the mixture may contain ?
(A) Sulphite (B) Carbonate (C) Nitrate (D) Bicarbonate
5. Sulphur dioxide may be recognised by its ?
(A) Characteristic pungent smell of burning sulphur
(B) Ability to turn dichromate paper green
(C) Ability to decolourize acidified KMnO_4 solution
(D) All
6. Chromyl chloride vapours are dissolved in water and solution is treated with 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
7. In a combination of NO_3^- , Br^- and I^- present in a mixture, Br^- and I^- interfere in the ring test for NO_3^- . These are removed by adding a solution of -
(A) AgNO_3 (B) Ag_2SO_4 (C) Ag_2CO_3 (D) None of these
8. A dark green bead in borax bead test indicates the presence of -
(A) Cr^{3+} (B) Mn^{2+} (C) Co^{2+} (D) Ni^{2+}
9. Lead has been placed in group 1st and 2nd because -
(A) It shows the valency one and two (B) It forms insoluble PbCl_2
(C) It forms lead sulphide (D) Its chloride is partly soluble in water
10. The group reagent for third group is NH_4OH in presence of -
(A) $(\text{NH}_4)_2\text{CO}_3$ (B) NaCl (C) $(\text{NH}_4)_2\text{SO}_4$ (D) NH_4Cl
11. What would you observe if you add with shaking excess of dilute NaOH solution to an aqueous solution of AlCl_3 ?
(A) A permanent white ppt. is formed
(B) No change at first, but a white ppt. is formed on standing
(C) A white ppt. is formed which later dissolves
(D) A green ppt. which turns red on standing in air
12. BaCl_2 solution gives a white ppt. with a solution of an acid radical which dissolves in dil. HCl with the evolution of a colourless, pungent smelling gas. The acid radical may be ?
(A) SO_4^{2-} (B) S^{2-} (C) SO_3^{2-} (D) CO_3^{2-}

13. $K_3Co(NO_2)_6$ is known as -
 (A) Fischer's salt (B) Thenard's blue (C) Rinman's green (D) Blue vitriol
14. In the precipitation of the iron group in qualitative analysis, ammonium chloride is added before adding ammonium hydroxide to -
 (A) Decrease concentration of OH^- ions (B) Prevent interference by phosphate ions
 (C) Increase concentration of Cl^- ions (D) Increase concentration of NH_4^+ ions
15. Potassium ferrocyanide is used in the detection of -
 (A) Cu^{2+} ion (B) Fe^{3+} ions (C) Both (D) None
16. The acidic solution of a salt produced a deep blue colour with starch iodide solution. The salt may be -
 (A) Chloride (B) Nitrite (C) Acetate (D) Bromide
17. Which of the following pairs of ions would be expected to form precipitate when dilute solutions are mixed?
 (A) Na^+ , SO_4^{2-} (B) NH_4^+ , CO_3^{2-} (C) Na^+ , S_2^{2-} (D) Fe^{3+} , PO_4^{3-}
18. Nessler's reagent is ?
 (A) K_2HgI_4 (B) $K_2HgI_4 + KOH$ (C) $K_2HgI_2 + KOH$ (D) $K_2HgI_4 + KI$
19. When bismuth chloride is poured into a large volume of water the white precipitate produced is ?
 (A) $Bi(OH)_3$ (B) Bi_2O_3 (C) $BiOCl$ (D) Bi_2OCl_3
20. $Fe(OH)_3$ can be separated from $Al(OH)_3$ by addition of ?
 (A) Dil. HCl (B) NaCl solution
 (C) NaOH solution (D) NH_4Cl and NH_4OH
21. Mark the compound which turns black with NH_4OH ?
 (A) Lead chloride (B) Mercurous chloride (C) Mercuric chloride (D) Silver chloride
22. If NaOH is added to an aqueous solution of zinc ions a white precipitate appears and on adding excess NaOH, the precipitate ?
 (A) Cationic part (B) Anionic part
 (C) Both in cationic and anionic parts (D) There is no zinc ion in the solution.
23. 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 ?
 (A) CO_3^{2-} (B) S^{2-} (C) SO_3^{2-} (D) NO_2^-
24. An aqueous solution of colourless metal sulphate M, gives a white ppt. with NH_4OH . This was soluble in excess of NH_4OH . On passing H_2S through this solution a white ppt. is formed. The metal M in the salt is ?
 (A) Ca (B) Ba (C) Al (D) Zn
25. The salt used for performing 'bead' test in qualitative inorganic analysis is ?
 (A) $K_2SO_4 \cdot Al_2(SO_4)_3 \cdot 24 H_2O$ (B) $FeSO_4 \cdot (NH_4)_2SO_4 \cdot 6H_2O$
 (C) $Na(NH_4)HPO_4 \cdot 4H_2O$ (D) $CaSO_4 \cdot 2H_2O$
26. A chloride dissolves appreciably in cold water. When placed on a platinum wire in Bunsen flame no distinctive colour is noticed, the cation would be ?
 (A) Mg^{2+} (B) Ba^{2+} (C) Pb^{2+} (D) Ca^{2+}
27. Which is not dissolved by dil. HCl ?
 (A) ZnS (B) MnS (C) $BaSO_3$ (D) $BaSO_4$

28. The brown ring test for NO_2^- and NO_3^- is due to the formation of complex ion with formula -
 (A) $[\text{Fe}(\text{H}_2\text{O})_6]^{2+}$ (B) $[\text{Fe}(\text{NO})(\text{CN})_5]^{2-}$
 (C) $[\text{Fe}(\text{H}_2\text{O})_5\text{NO}]^{2+}$ (D) $[\text{Fe}(\text{H}_2\text{O})(\text{NO})_5]^{2+}$
29. Which of the following metal sulphides has maximum solubility in water -
 (A) $\text{HgS } K_{\text{sp}} = 10^{-54}$ (B) $\text{CdS } K_{\text{sp}} = 10^{-30}$
 (C) $\text{FeS } K_{\text{sp}} = 10^{-20}$ (D) $\text{ZnS } K_{\text{sp}} = 10^{-22}$
30. Which one of the following statement is correct -
 (A) From a mixed precipitate of AgCl and AgI , ammonia solution dissolves only AgCl
 (B) Ferric ions give a deep green precipitate on adding potassium ferrocyanide solution
 (C) On boiling a solution having K^+ , Ca^{2+} and HCO_3^- ions we get a precipitate of $\text{K}_2\text{Ca}(\text{CO}_3)_2$
 (D) Manganese salts give a violet borax bead test in the reducing flame
31. When H_2S is passed through Hg_2^{2+} , we get -
 (A) HgS (B) $\text{HgS} + \text{Hg}_2\text{S}$ (C) $\text{HgS} + \text{Hg}$ (D) Hg_2S
32. Potassium chromate solution is added to an aqueous solution of a metal chloride. The precipitate thus obtained are insoluble in acetic acid. These are subjected to flame test, the colour of the flame is -
 (A) Lilac (B) Apple green (C) Crinison red (D) Golden yellow
33. Sometimes yellow turbidity appears while passing H_2S gas even in the absence of II group radicals. This is because of -
 (A) Sulphur is present in the mixture as impurity
 (B) IV group radicals are precipitated as sulphides
 (C) The oxidation of H_2S gas by some acid radicals
 (D) III group radicals are precipitated as hydroxides
34. A metal salt solution gives a yellow ppt with silver nitrate. The ppt dissolves in dil. nitric acid as well as in ammonium hydroxide. The solution contains -
 (A) Bromide (B) Iodide (C) Phosphate (D) Chromate
35. A blue colouration is not obtained when -
 (A) Ammonium hydroxide dissolves in copper sulphate
 (B) Copper sulphate solution reacts with $\text{K}_4[\text{Fe}(\text{CN})_6]$
 (C) Ferric chloride reacts with sodium ferrocyanide
 (D) Anhydrous white CuSO_4 is dissolved in water
36. A pale green crystalline metal salt of M dissolves freely in water. On standing it gives a brown ppt on addition of aqueous NaOH . The metal salt solution also gives a black ppt on bubbling H_2S in basic medium. An aqueous solution of the metal salt decolourizes the pink colour of the permanganate solution. The metal in the metal salt solution is -
 (A) Copper (B) Aluminium (C) Lead (D) Iron

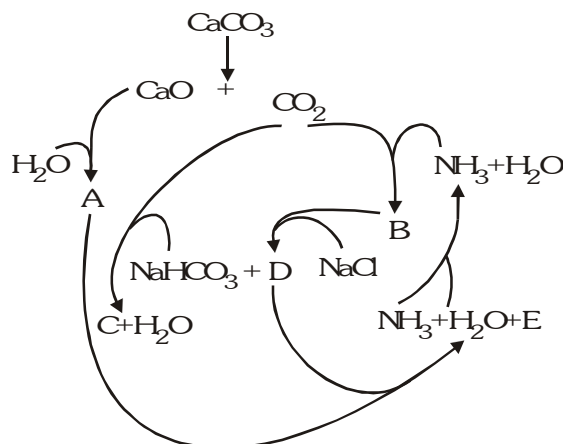
CHECK YOUR GRASP								ANSWER KEY					EXERCISE -1							
Que.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Ans.	B	A	A	A	D	D	B	A	D	D	C	C	A	A	C	B	D	B	C	C
Que.	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36				
Ans.	B	B	C	D	C	A	D	C	C	A	C	B	C	C	B	D				

EXERCISE-02**BRAIN TEASERS**

SELECT THE CORRECT ALTERNATIVES (ONE OR MORE THEN ONE CORRECT ANSWERS)

1. Identify the incorrect reaction (s) -
(A) $\text{K}_2\text{Cr}_2\text{O}_7 + 4\text{NaCl} + 3\text{H}_2\text{SO}_4 \text{ (conc.)} \longrightarrow 2\text{CrO}_2\text{Cl}_2 + 2\text{Na}_2\text{SO}_4 + \text{K}_2\text{SO}_4 + 3\text{H}_2\text{O}$
(B) $\text{K}_2\text{Cr}_2\text{O}_7 + 6\text{KI} + 7\text{H}_2\text{SO}_4 \text{ (conc.)} \longrightarrow 3\text{I}_2 + \text{Cr}_2(\text{SO}_4)_3 + 4\text{K}_2\text{SO}_4 + 7\text{H}_2\text{O}$
(C) $\text{K}_2\text{Cr}_2\text{O}_7 + 4\text{AgCl} + 3\text{H}_2\text{SO}_4 \text{ (conc.)} \longrightarrow 2\text{CrO}_2\text{Cl}_2 + 2\text{Ag}_2\text{SO}_4 + \text{K}_2\text{SO}_4 + 3\text{H}_2\text{O}$
(D) $\text{MnO}_2 + \text{NaCl} + 2\text{H}_2\text{SO}_4 \text{ (conc.)} \longrightarrow \text{NaHSO}_4 + \text{MnSO}_4 + \text{HCl} + \text{H}_2\text{O} + 1/2\text{O}_2$
2. Which of the following statement (s) is (are) true -
(A) Cu^{2+} salts form soluble complex with excess KCN
(B) Cu^{2+} salts form soluble complex with aqueous ammonia
(C) Cu^{2+} salts form soluble complex with KI
(D) A piece of iron or zinc when placed in Cu^{2+} salt solution, precipitates copper
3. A mixture of two white substances was dissolved in water. On passing Cl_2 gas through the solution a deep brown colour is developed. Addition of BaCl_2 solution to the original solution gives a white ppt. Addition of a large amount of NaOH solution to the original solution gives a white ppt, whose suspension in water is used as an ant-acid, the mixture gives golden yellow colour flame. What is the chemical composition of the mixture -
(A) NaBr & MgSO_4 (B) NaBr & CaSO_4 (C) NaBr & $\text{Al}_2(\text{SO}_4)_3$ (D) NaBr & ZnSO_4
4. $\text{KBr} + \text{MnO}_2 + \text{H}_2\text{SO}_4 \text{ (conc.)} \longrightarrow \text{KHSO}_4 + \text{MnSO}_4 + \text{H}_2\text{O} + [\text{X}]$ (unbalanced equation) -
(A) X turns starch paper orange red
(B) X with AgNO_3 solution gives a pale yellow ppt which is completely soluble in excess ammonium hydroxide
(C) X produces violet colour in organic layer in KI solution
(D) X is liberated when a mixture of KBr, $\text{K}_2\text{Cr}_2\text{O}_7$ and conc. H_2SO_4 is heated
5. An inorganic lewis acid [X] gives gelatinous white ppt. With NH_4OH in presence of NH_4Cl . [X] will respond to which of the following characteristics -
(A) X fumes in moist air
(B) X on heating with solid $\text{K}_2\text{Cr}_2\text{O}_7$ and conc. H_2SO_4 gives deep red or orange red fumes
(C) X on addition of excess NaOH gives white ppt
(D) X on heating with Na_2CO_3 and cobalt nitrate gives a blue bead in oxidising flame
6. SO_2 and CO_2 both turn lime water (A) milky, SO_2 also turns $\text{K}_2\text{Cr}_2\text{O}_7/\text{H}^+$ (B) green while O_2 is soluble in pyrogallol (C) turning it black. These gases are to be detected in order by using these reagents. The order is -
(A) (A), (B), (C) (B) (B), (C), (A) (C) (B), (A), (C) (D) (A), (C), (B)
7. Three test tubes A, B, C contain Pb^{2+} , Hg_2^{2+} and Ag^+ (but unknown). To each aqueous solution NaOH is added in excess. Following changes occur -
A : Black ppt B : Brown ppt C : White ppt but dissolves in excess of NaOH
A, B and C contain respectively :
(A) Pb^{2+} , Hg_2^{2+} and Ag^+ (B) Hg_2^{2+} , Ag^+ , Pb^{2+}
(C) Ag^+ , Pb^{2+} , Hg_2^{2+} (D) Ag^+ , Hg_2^{2+} and Pb^{2+}

8. Of the following oxides, all are soluble in NaOH(aq) except -
 (A) ZnO (B) Al₂O₃ (C) Fe₂O₃ (D) SnO₂
9. The solvay process can be represented by the following scheme



In the above process, the correct options are :

- (A) A = Ca(OH)₂ (B) B = NH₄HCO₃ (C) E = CaCl₂ (D) C = NaHCO₃
10. Reddish brown gas is obtained when the following are treated with conc. H₂SO₄ :
 (A) Br⁻ (B) NO₃⁻ (C) NO₂⁻ (D) I⁻
11. KI solution identifies -
 (A) Hg₂²⁺ (B) Pb²⁺ (C) Ag⁺ (D) Cu²⁺
12. The only cations present in a slightly acidic solution are Fe³⁺, Zn²⁺ and Cu²⁺. The reagent that when added in excess to this solution would identify and separate Fe³⁺ in one step is -
 (A) 2 M HCl (B) 6 M NH₃ (C) 6 M NaOH (D) H₂S gas
13. A test-tube containing a nitrate and another containing a bromide and MnO₂ are treated with conc. H₂SO₄. The brown fumes evolved are passed in water. The water will be coloured by -
 (A) The nitrate (B) The bromide (C) Both (D) None of the two
14. Production of a green edged flame on igniting the vapours evolved by heating a given inorganic salt with a few ml of ethanol and conc. H₂SO₄ indicates the presence of -
 (A) Tartrate (B) Oxalate (C) Acetate (D) Borate
15. When CS₂ layer containing both Br₂ and I₂ is shaken with excess of Cl₂ water, the violet colour due to I₂ disappears and orange colour due to Br₂ appears. The disappearance of violet colour is due to the formation of -
 (A) I₃⁻ (B) HIO₃ (C) ICl₂ (D) I⁻
16. Which one among the following pairs of ions cannot be separated by H₂S in dilute hydrochloric acid-
 (A) Bi³⁺, Sn⁴⁺ (B) Al³⁺, Hg²⁺ (C) Zn²⁺, Cu²⁺ (D) Ni²⁺, Cu²⁺
17. Yellow ammonium sulphide solution is a suitable reagent for the separation of -
 (A) HgS and PbS (B) PbS and Bi₂S₃ (C) Bi₂S₃ and CuS (D) CdS and As₂S₃
18. What product is formed by mixing the solution of K₄[Fe(CN)₆] with the solution of FeCl₃ -
 (A) Ferro-ferricyanide (B) Ferric-ferrocyanide
 (C) Ferri-ferricyanide (D) None

19. Which of the following will not give positive chromyl chloride test-
- (A) Copper chloride, CuCl_2 (B) Mercuric chloride, HgCl_2
 (C) Mercurous chloride, HgCl_2 (D) Zinc chloride, ZnCl_2
20. When chlorine water is added to an aqueous solution of potassium halide in presence of chloroform, a violet colour is obtained. On adding more of chlorine water, the violet colour disappears, and a colourless solution is obtained. This test confirms the presence of the following in aqueous solution -
- (A) Iodide (B) Bromide (C) Chloride (D) Iodide and bromide
21. Which compound does not dissolve in hot dilute HNO_3 -
- (A) HgS (B) PbS (C) CuS (D) CdS
22. An aqueous solution of FeSO_4 , $\text{Al}_2(\text{SO}_4)_3$ and chrome alum is heated with excess of Na_2O_2 and filtered. The materials obtained are -
- (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. Three separate samples of a solution of a single salt gave these results. One formed a white precipitate with excess ammonia solution, one formed a white precipitate with dil. NaCl solution and one formed a black precipitate with H_2S . The salt could be -
- (A) AgNO_3 (B) $\text{Pb}(\text{NO}_3)_2$ (C) $\text{Hg}(\text{NO}_3)_2$ (D) MnSO_4
24. 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 solution, a white precipitate is obtained which does not dissolve in dil. HNO_3 . The anion could be -
- (A) CO_3^{2-} (B) Cl^- (C) SO_4^{2-} (D) S^{2-}
25. In the separation of Cu^{2+} and Cd^{2+} in 2nd group qualitative analysis of cations, tetrammine copper (II) sulphate and tetrammine cadmium (II) sulphate react with KCN to form the corresponding cyano complexes. Which one of the following pairs of the complexes and their relative stability enables the separation of Cu^{2+} and Cd^{2+} :
- (A) $\text{K}_3[\text{Cu}(\text{CN})_4]$ more stable and $\text{K}_2[\text{Cd}(\text{CN})_4]$ less stable
 (B) $\text{K}_2[\text{Cu}(\text{CN})_4]$ less stable and $\text{K}_2[\text{Cd}(\text{CN})_4]$ more stable
 (C) $\text{K}_2[\text{Cu}(\text{CN})_4]$ more stable and $\text{K}_2[\text{Cd}(\text{CN})_4]$ less stable
 (D) $\text{K}_3[\text{Cu}(\text{CN})_4]$ less stable and $\text{K}_2[\text{Cd}(\text{CN})_4]$ more stable
26. When $\text{K}_2\text{Cr}_2\text{O}_7$ crystals are heated with conc. HCl , the gas evolved is -
- (A) O_2 (B) Cl_2 (C) CrO_2Cl_2 (D) HCl
27. On the addition of a solution containing CrO_4^{2-} ions to the solution of Ba^{2+} , Sr^{2+} and Ca^{2+} ions, the ppt obtained first will be of -
- (A) CaCrO_4 (B) SrCrO_4 (C) BaCrO_4 (D) A mixture of all the three
28. A mixture of chlorides of copper, cadmium, chromium, iron and aluminium was dissolved in water acidified with HCl and hydrogen sulphide gas was passed for sufficient time. It was filtered, boiled and a few drops of nitric acid were added while boiling. To this solution ammonium chloride and sodium hydroxide were added in excess and filtered. The filtrate shall give test for -
- (A) Sodium and iron (B) Sodium, chromium and aluminium
 (C) Aluminium and iron (D) Sodium, iron, cadmium and aluminium

29. A salt on treatment with dil. HCl gives a pungent smelling gas and a yellow precipitate. The salt gives green flame when tested. The 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
30. CrO_3 dissolves in aqueous NaOH to give -
- (A) $\text{Cr}_2\text{O}_7^{2-}$ (B) CrO_4^{2-} (C) Cr(OH)_3 (D) Cr(OH)_2
31. A mixture of two salts is not water soluble but dissolves completely in dil HCl to form a colourless solution. The mixture could be -
- (A) AgNO_3 and KBr (B) BaCO_3 and ZnS
 (C) FeCl_3 and CaCO_3 (D) $\text{Mn(NO}_3)_2$ and MgSO_4
32. Which of the following combinations in an aqueous medium will give a red colour or precipitate -
- (A) $\text{Fe}^{3+} + \text{SCN}^-$ (B) $\text{Fe}^{2+} + [\text{Fe(CN)}_6]^{3-}$
 (C) $\text{Ni}^{2+} + \text{dimethylglyoxime} + \text{NH}_3$ solution (D) $\text{Cu}^{2+} + [\text{Fe(CN)}_6]^{4-}$
33. Acidic $\text{K}_2\text{Cr}_2\text{O}_7$ reacts with H_2S to produce-
- (A) Cr^{6+} ions (B) Cr^{3+} ions (C) SO_2 (D) S
34. A yellow precipitate is obtained when -
- (A) Lead acetate solution is treated with K_2CrO_4
 (B) $\text{Pb(NO}_3)_2$ solution is treated with K_2CrO_4
 (C) AgNO_3 solution treated with KI
 (D) H_2S is passed through a solution of CdSO_4
35. Which of the following ions can be separated by using NH_4Cl and NH_4OH -
- (A) Fe^{3+} and Cr^{3+} (B) Cr^{3+} and Co^{2+} (C) Cr^{3+} and Al^{3+} (D) Al^{3+} and Ba^{2+}
36. $\text{Al}_2(\text{SO}_4)_3 + \text{NH}_4\text{OH} \longrightarrow \text{X}$
 Select the correct statement (s) about compound X :
- (A) X is a white coloured compound (B) X is insoluble in excess of NH_4OH
 (C) X is soluble in NaOH (D) X can be used as an antacid
37. Which of the following cations cannot be separated by adding NH_4Cl , NH_4OH and $(\text{NH}_4)_2\text{CO}_3$ to their solution ?
- (A) Ca^{2+} and Sr^{2+} (B) Ba^{2+} and Sr^{2+} (C) Ba^{2+} and Mg^{2+} (D) Ca^{2+} and Ba^{2+}
38. On being heated, which of the following substances will give a gas that turns limewater milky ?
- (A) Na_2CO_3 (B) ZnCO_3 (C) ZnSO_3 (D) MgCO_3
39. On being heated, which of the following substances will give a white sublimate ?
- (A) NH_4Cl (B) HgCl_2 (C) AgCl (D) Hg_2Cl_2
40. On being strongly heated, which of the following substances will leave a black residue ?
- (A) $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ (B) ZnCO_3 (C) PbCO_3 (D) MnSO_4
41. Which of the following cations will turn a borax bead green in an oxidising flame ?
- (A) Fe^{2+} (B) Mn^{2+} (C) Cr^{3+} (D) Cu^{2+}
42. Which of the following cations will turn a borax bead blue in an oxidising flame ?
- (A) Fe^{3+} (B) Fe^{2+} (C) Co^{2+} (D) Cu^{2+}
43. Which of the following substances are blue ?
- (A) $\text{Fe(BO}_2)_2$ (B) CoAl_2O_4 (C) $\text{Co(BO}_2)_2$ (D) NaCoPO_4

44. On reaction with dilute H_2SO_4 , which of the following salts will give out a gas that turns an acidified dichromate paper green ?
- (A) Na_2CO_3 (B) Na_2S (C) ZnSO_3 (D) FeS
45. Which of the following ions can be separated by using dilute HCl ?
- (A) Ag^+ and Cu^{2+} (B) Ag^+ and Hg_2^{2+} (C) Hg_2^{2+} and Cd^{2+} (D) Ag^+ and Al^{3+}
46. Which of the following ions can be separated by using H_2S in the presence of dilute HCl ?
- (A) Cu^{2+} and Co^{2+} (B) Pb^{2+} and Ni^{2+} (C) Hg^{2+} and Cu^{2+} (D) Cu^{2+} and Bi^{3+}
47. Which of the following ions can be separated by using NH_4Cl and NH_4OH ?
- (A) Fe^{3+} and Cr^{3+} (B) Cr^{3+} and Co^{2+} (C) Cr^{3+} and Al^{3+} (D) Al^{3+} and Ba^{2+}
48. Which of the following mixtures of ions in solution can be separated by using an NH_3 solution ?
- (A) Hg_2^{2+} and Ag^+ (B) Bi^{3+} and Cu^{2+} (C) Ag^+ and Pb^{2+} (D) Cu^{2+} and Cd^{2+}
49. Which of the following mixtures of ions in solution can be separated by using an NaOH solution ?
- (A) Fe^{3+} and Pb^{2+} (B) Pb^{2+} and Sn^{2+} (C) Zn^{2+} and Sn^{2+} (D) Al^{3+} and Cu^{2+}
50. Which of the following mixtures of ions in solution can be separated by using dilute H_2SO_4 ?
- (A) Zn^{2+} and Pb^{2+} (B) Ba^{2+} and Pb^{2+} (C) Mn^{2+} and Sr^{2+} (D) Sr^{2+} and Ba^{2+}

Brain Teasers						Answer Key				Exercise -2					
Que.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Ans.	C,D	A,B,D	A	A,C,D	A,B,D,	C	B	C	A,B,C,	A,B,C	B,C	B	B	D	B
Que.	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Ans.	A	D	B	B	A	A	B	B	B	A	B	C	B	B	B
Que.	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
Ans.	B	A,C	B,D	A,B,C,D	B,D	A,B,C,D	A,B,D	B,C,D	A,B,D	A,D	A,C	C,D	B,C,D	B,C,D	A,C,D
Que.	46	47	48	49	50										
Ans.	A,B	B,D	A,B,C	A,D	A,C										

EXERCISE-03**MISCELLANEOUS TYPE QUESTIONS****TRUE / FALSE**

1. In the ring test for NO_3^- , removal of Br^- and I^- is done by adding AgNO_3 solution.
2. CO_3^{2-} & HCO_3^- of sodium both produce precipitate with MgCl_2 aq.
3. NO_3^- solution produce brown ring with FeSO_4 & dil. H_2SO_4 .
4. HgCl_2 gives not chromyl chloride test.
5. Mn^{+2} when boiled with $\text{Na}_2\text{S}_2\text{O}_8/\text{H}^+$ it produce purple coloration.
6. Alkaline Solution of sodium nitro pruside produce volatile coloration with $\text{H}_2\text{S}_{(\text{g})}$.

FILL IN THE BLANKS

1. A solution of salt in HCl when diluted with water turns milky. It indicates the presence of
2. In group III, the basic radicals are precipitated as their
3. The solubility product of hydroxide of Fe^{2+} is than that of Fe^{3+} .
4. Group IV basic radicals are precipitated as from medium.
5. NaNO_3 when treated with Zn dust & NaOH solution it produce gas.
6. NH_4NO_3 on heating gives Solid substance.
7. Mix of NaI (s) + $\text{K}_2\text{Cr}_2\text{O}_7$ (s) + conc. H_2SO_4 . When heated in a test tube dark vapours evolve is
8. $\text{Cr}_2(\text{SO}_4)_3$ solution produce colour with Na_2O (excess) and colour with Na_2O_2 (excess.)

MATCH THE COLUMN

1. Match the following

Column-I		Column-II	
(A)	CrCl_3 (aq)	(p)	Produce ppt with excess of NaOH
(B)	CuSO_4 (aq)	(q)	Produce coloured Solution with excess of ammonia
(C)	$(\text{NH}_4)_2\text{CO}_3$ (aq)	(r)	Produce gases product when heated with KOH (aq)
(D)	AgNO_3 (aq)	(s)	Produce gas with dil. H_2SO_4

2. Match the following

Column-I		Column-II	
(A)	$\text{Fe}(\text{SCN})_3 + \text{KF}$ (aq) excess	(p)	Produce coloured product (s)
(B)	$\text{CrO}_2\text{Cl}_2 + \text{NaOH}$ (aq)	(q)	diamagnetic product
(C)	$\text{Ni}^{+2} + \text{dmg} \xrightarrow[\text{CH}_3\text{COONa}]{\text{CH}_3\text{COOH}}$	(r)	Hydrogen bonded product
(D)	$\text{Na}_2\text{SO}_3 + \text{Cr}_2\text{O}_7^{2-} \xrightarrow{\text{H}^+}$	(s)	Tetrahedral geometry around metal

Note :- dmg = dimethyl glyoxime

3. Match the following

Column-I		Column-II	
(A)	$\text{H}_3\text{P}_3\text{O}_9$	(p)	S-O-S bond is present
(B)	$\text{H}_2\text{S}_2\text{O}_7$	(q)	Di-basic acid
(C)	$\text{H}_2\text{S}_4\text{O}_6$	(r)	P-O-P bond is present
(D)	$\text{H}_4\text{P}_2\text{O}_5$	(s)	Central atom (S or P) in maximum oxidation state

4. Match the following

Column-I		Column-II	
(A)	Soluble in a concentrated NH_3 solution	(p)	Ag_2S
(B)	Soluble in excess KCN solution	(q)	$\text{Cu}(\text{OH})_2$
(C)	Soluble in excess hypo solution	(r)	AgBr
(D)	Soluble in conc. HCl	(s)	AgCl

5. Match the following

Column-I		Column-II	
(A)	Colourless gas evolved on addition of dil. H_2SO_4	(p)	$\text{S}_2\text{O}_3^{2-}$
(B)	White ppt. on addition of AgNO_3	(q)	S^{2-}
(C)	Black ppt. obtained when HgCl_2 is added in little amount	(r)	NO_2^-
(D)	The ppt. obtained on addition of AgNO_3 followed by NH_3 solution	(s)	CH_3CO_2^-

ASSERTION & REASON

These questions contains, Statement I (assertion) and Statement II (reason).

(A) Statement-I is true, Statement-II is true ; Statement-II is correct explanation for Statement-I.

(B) Statement-I is true, Statement-II is true ; Statement-II is NOT a correct explanation for statement-I

(C) Statement-I is true, Statement-II is false

(D) Statement-I is false, Statement-II is true

1. **Statement -I** : Borax bead test is applicable only to coloured salts.

Because

Statement -II : In borax bead test, coloured salts are decomposed to give colored metal metaborates.

2. **Statement -I** : First group basic radicals are precipitated as thier chlorides.

Because

Statement -II : The solubility product of these chlorides are more than the solubility product of other basic radical chlorides.

3. **Statement -I** : Cu^{2+} and Cd^{2+} are separated from each other by first adding KCN solution and then passing H_2S gas.
Because
Statement -II : KCN reduces Cu^{2+} to Cu^+ and forms a complex with it.
4. **Statement -I** : CaSO_4 dissolves in $(\text{NH}_4)_2\text{SO}_4$ solution.
Because
Statement -II : CaSO_4 forms a soluble complex of $(\text{NH}_4)_2[\text{Ca}(\text{SO}_4)_2]$
5. **Statement -I** : Nessler's reagent gives a brown precipitate with NH_3 .
Because
Statement -II : NH_4OH gives a brown precipitate with Fe^{3+} .
6. **Statement -I** : NH_4Cl is added in III group basic radicals to suppress the ionisation of NH_4OH .
Because
Statement -II : In the presence of high concentration of OH^- ions, basic radicals of other groups will also get precipitated in III group.

COMPREHENSION BASED QUESTIONS

Comprehension # 1

A chemist opened a cupboard to find four bottles containing water solutions, each of which has lost its label. Bottles 1, 2, 3 contained colourless solutions, whilst Bottle 4 contained a blue solution. The labels from the bottles were lying scattered on the floor of the cupboard. They were

Copper (II) sulphate

Sodium carbonate

Lead nitrate

hydrochloric acid

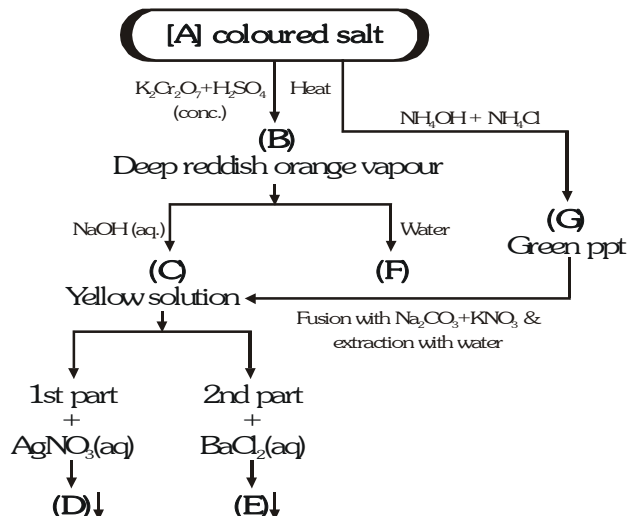
By mixing samples of the contents of the bottles, in pairs, the chemist made the following observations :

- | | | |
|-------|---------------------|------------------------|
| (i) | Bottle 1 + Bottle 2 | white precipitate |
| (ii) | Bottle 1 + Bottle 3 | white precipitate |
| (iii) | Bottle 1 + Bottle 4 | white precipitate |
| (iv) | Bottle 2 + Bottle 3 | colourless gas evolved |
| (v) | Bottle 2 + Bottle 4 | no visible reaction |
| (vi) | Bottle 3 + Bottle 4 | blue precipitate |

- Chemical formula of white precipitate in observation (i) is :
 (A) CuCl_2 (B) PbCl_2
 (C) PbCO_3 (D) CuSO_3
- Colourless solution present in Bottle-1 is -
 (A) CuSO_4 (B) HCl
 (C) $\text{Pb}(\text{NO}_3)_2$ (D) Na_2CO_3
- Nature of gas evolved in observation (iv) is -
 (A) Acidic (B) Neutral (C) Basic (D) Amphoteric
- Chemical formula of white ppt. formed in observation (iii) is :
 (A) PbCl_2 (B) PbCO_3 (C) CuCO_3 (D) PbSO_4

Comprehension # 2

Read the following comprehension carefully and answer the following questions.



- The colour of the ppt (D) & (E) are :
 (A) white & yellow (B) yellow
 (C) brick red & yellow (D) yellow and brick red
- Yellow solution (C) is an important laboratory reagent and is used in the estimation of :
 (A) Pb^{2+} (B) Fe^{3+} (C) Cd^{2+} (D) None of these
- The compound (A) is :
 (A) $CrCl_3$ (B) $CrBr_3$ (C) $Cr(CH_3COO)_3$ (D) $Cr(NO_3)_3$
- $[A] (s) + MnO_2 + H_2SO_4 (conc.) \longrightarrow X$ Greenish yellow gas.
 Select the correct choice for [X] :
 (A) It gives yellow ppt. with $AgNO_3$ (B) It liberates I_2 from KI solution
 (C) It turns starch paper orange red (D) It turns titan yellow solution red

Comprehension # 3

Three metal ions x^{+2} , y^{+2} , z^{+2} are identify in qualitative analysis. Nitrates of x^{+2} , y^{+2} , z^{+2} dissolve in three seprate test tubes and gives following observation.

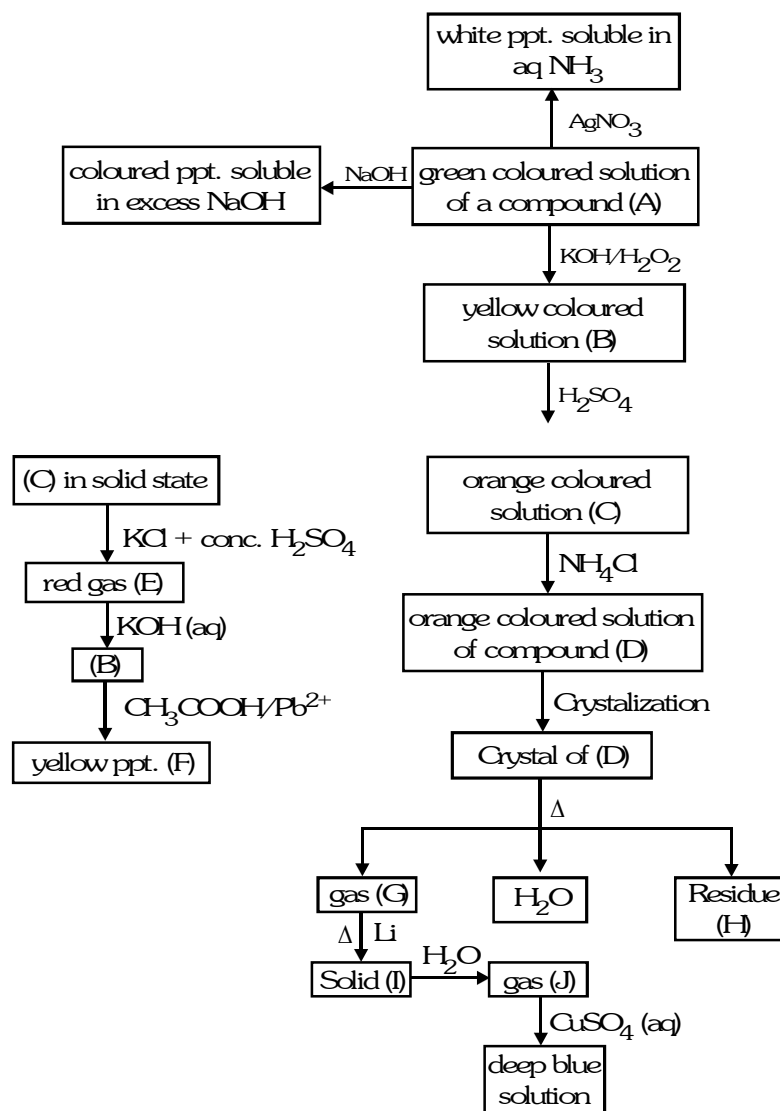
- All solution produce carbonate precipitate with $(NH_4)_2CO_3$
- Only one produce white ppt on addition of NaCl.
- Out of 3 cations two produce sulphide ppt.
- Sulphide of y^{+2} is not produce by H_2S/H^+ but produce when H_2S is passed in basic medium.
- Only y^{+2} produce soluble sulphate
- x^{+2} gives no ppt with dil NH_4OH .

- Select in correct statment :
 (A) y^{+2} not produce precipitate with Ist group reagent in salt analysis
 (B) y^{+2} not produce ppt with 2nd group reagent in salt analysis
 (C) z^{+2} produce ppt with IInd group reagent in salt analysis
 (D) z^{+2} is not produce ppt with Ist group reagent in salt analysis

2. Select order of K_{sp} of sulphide of x^{+2} , y^{+2} , z^{+2} -
- (A) $x_s > y_s > z_s$ (B) $x_s > z_s > y_s$
 (C) $y_s > z_s > x_s$ (D) $z_s > y_s > x_s$
3. Select correct about xCO_3 , yCO_3 , zCO_3 -
- (A) All are soluble in dil. H_2SO_4 (B) All are soluble in dil HCl
 (C) None is soluble in dil. H_2SO_4 (D) Except ZCO_3 all are soluble in dil. HCl
4. (i) $x^{+2} + H_2S \xrightarrow{NH_4OH}$ (ii) $x^{+2} + NaOH (dil) \longrightarrow$
 (iii) $x^{+2} + Na_2CO_3 \longrightarrow$
- Precipitate is obtain in
- (A) Reaction (i), (ii), (iii) (B) Only in reaction (iii)
 (C) Only in reaction (i) and (ii) (D) Only in reaction (ii)

Comprehension # 4

Read the following short write up and answer subsequent questions based on observations (A) to (J).



- Compound A and B are respectively :
 (A) FeCl_2 ; FeCl_3 (B) CuCl_2 ; $2\text{H}_2\text{O}$; $[\text{CuCl}_4]^{-2}$
 (C) CrCl_3 ; K_2CrO_4 (D) NiCl_2 ; NiCl_3
- Gas (J) is also produced by :
 (i) heating NH_4NO_3 (ii) heating NH_4NO_2
 (iii) heating NH_4Cl (iv) Reaction of NH_4Cl and Ca(OH)_2
 (A) (i) and (iii) (B) (i) and (ii) (C) (i) and (iv) (D) (iii) and (iv)
- Select the incorrect reaction :
 (A) (C) in solid state + KBr + conc. $\text{H}_2\text{SO}_4 \longrightarrow$ Red gas
 (B) (C) in solid state + KCl + conc. $\text{H}_2\text{SO}_4 \longrightarrow$ Red gas
 (C) (C) in solid state + FeCl_3 + conc. $\text{H}_2\text{SO}_4 \longrightarrow$ Red gas
 (D) (C) in solid state + HgCl_2 + conc. $\text{H}_2\text{SO}_4 \longrightarrow$ Red gas

MISCELLANEOUS TYPE QUESTION	ANSWER KEY	EXERCISE -3
<ul style="list-style-type: none"> <u>True / False</u> 1. F 2. F 3. F 4. T 5. T 6. T <u>Fill in the Blanks</u> 1. Bi^{3+} 2. Hydroxides 3. Higher 4. Sulphides, Ammoniacal 5. NH_3 6. None 7. I_2 8. Green, Yellow <u>Match the Column</u> 1. (A) - q (B) - p, q (C) - r, s (D) - p 2. (A) - q (B) - p, q, s (C) - p, q, r (d) - p, q, s 3. (A) - p, r (B) - p, q (C) - p, r (D) - p, q, s 4. (A) - q, r, s (B) - p, q, r, s (C) - q, r, s (d) - q, s 5. (A) - p, q, s (B) - p, r, s (C) - q, (d) - q <u>Assertion - Reason Questions</u> 1. A 2. C 3. B 4. A 5. C 6. A <u>Comprehension Based Questions</u> Comprehension #1 : 1. B 2. C 3. A 4. D Comprehension #2 : 1. C 2. A 3. A 4. B Comprehension #3 : 1. D 2. A 3. D 4. B Comprehension #4 : 1. C 2. D 3. D 		

EXERCISE-04 [A]**CONCEPTUAL SUBJECTIVE EXERCISE**

1. Colourless salt (A) + NaOH (excess) $\xrightarrow{\Delta}$ gas (B) giving white fumes with HCl + alkaline solution (C)
- (C) + Zn \longrightarrow gas (B)
- (A) $\xrightarrow{\Delta}$ gas (D) + liquid (E)
- D, E both triatomic
- identify (A, B, C, D) and (E).
2. Complete and balance the following reactions :
- (A) $\text{Cu} + \text{HNO}_3 \text{ (dil)} \longrightarrow \text{NO} + \dots + \dots$
- (B) $\text{Pb}(\text{NO}_3)_2 \xrightarrow{\text{heat}} \text{PbO} + \dots + \dots$
- (C) $\text{CuSO}_4 + \text{NH}_4\text{OH (excess)} \longrightarrow \dots$
- (D) $\text{AgCl} + \text{NH}_4\text{OH} \longrightarrow \dots$
3. Aqua-regia dissolves gold. Write reaction.
4. What happens when -
- (i) Hydrogen sulphide is bubbled through an aqueous solution of sulphur dioxide
- (ii) Hydrogen sulphide is passed through acidified ferric chloride solution.
- (iii) Sulphur is boiled with caustic soda solution.
5. Sodium salt (A) of a dibasic acid $\xrightarrow{\text{HCl}}$ gas (B) and clear solution of gas (B) turns $\text{K}_2\text{Cr}_2\text{O}_7$ to green and also lime water milky. identify (A) and (B).
6. To a solution containing Ca^{2+} , Ag^+ , Cu^{2+} and K^+ , 2M HCl is added when a white precipitate (A) is obtained. After filtration H_2S is passed through the filtrate, a black ppt. (B) is formed. On removing (B) by filtration, it gave a white ppt. (C) with Na_2CO_3 solution. Identify (A), (B) and (C).
7. An aqueous solution of a gas (X) gives the following reactions :
- (i) It decolourises an acidified $\text{K}_2\text{Cr}_2\text{O}_7$ solution.
- (ii) On boiling with H_2O_2 and cooling it and then adding an aqueous solution of BaCl_2 , a ppt. insoluble in dil. HCl, is produced.
- (iii) On passing H_2S in the solution, white turbidity is formed.
- Identify (X) and give chemical reactions of sets (i) to (iii).
8. A solution containing several unknown cations is treated with dil. HCl and a ppt. forms. The ppt. is filtered and the filtrate at pH 1.0 is treated with H_2S , no ppt. forms. At pH 8.0 H_2S causes the formation of a ppt., the filtrate from which gives no ppt. on treatment with Na_2CO_3 . Which group of cations are present in the original solution ?
9. The aqueous solution of an inorganic compound (X) yielded a white precipitate when treated with dil HNO_3 and AgNO_3 . Another sample of the solution of (X) when treated with NaOH gave a white precipitate first which dissolved in excess of NaOH yielding a colorless solution. When H_2S gas was passed through that solution a white precipitate was obtained. Identify the compound (X) and give the reactions.

10. An orange coloured solid (A) is soluble in water and gives a gas (B) and green coloured solid (C) on heating. The compound (A) gives a gas (D) when reacts with NaOH and solution turns yellow. The gas (D) turns red litmus blue. Identify the compounds (A) to (D) and explain the reaction.
11. A compound (X) on heating with an excess of NaOH solution gives a gas (Y) which gives white fumes on exposure to HCl. Heating is continued to expel the gas completely. The resultant alkaline solution again liberates the same gas Y when heated with Zn powder. However, the compound (X) when heated alone does not give nitrogen. Identify the compounds X and Y.
12. A salt reacts with NaOH to form a green coloured ppt. (X) which is soluble in excess of NaOH. (X) on heating gives a green powder (Y). (Y) on fusion with NaOH in air gives a yellow coloured solution (Z). Identify the compound X, Y & Z.
13. Identify the inorganic salt A whose aqueous solution gives following reactions.
- Pale yellow precipitate with AgNO_3 solution, insoluble in dil HNO_3
 - White precipitate with NH_4OH and also with NaOH solution. However the precipitate does not dissolve in excess of NH_4OH but soluble in excess of NaOH.
14. Two species (A) and (B) exists in equilibrium at pH of about 4 and can be interconverted by changing the pH. Acidified solution of (B) is orange, and on adding H_2O_2 it forms deep blue colour due to the formation of compound (C), this blue colour fades away gradually. Further acidified solution of (B) on reaction with NaCl gives orange red fumes due to the formation of (D). Identify (A), (B), (C) & (D).
15. A compound X does not give N_2 on heating. Its aqueous solution when heated with caustic soda liberate a gas Y which turns red litmus blue. Heating of alkaline solution of X is continued to expell the gas Y completely. However residual solution again liberates the gas Y when heated with Zinc powder. Identify X and Y.
16. An aqueous solution of a gas (X) shows the following reactions.
- It turns red litmus blue
 - When added in excess to a CuSO_4 solution, a deep blue colour is obtained
 - On addition of FeCl_3 solution a brown precipitate soluble in dilute HNO_3 is obtained.
- Identify (X) and give equations for the reactions at step (ii) and (iii)
17. Complete the following by identifying (A) to (F).
- $\text{CuSO}_4 \cdot 5\text{H}_2\text{O} \xrightarrow{100^\circ\text{C}} (\text{A}) \xrightarrow{230^\circ\text{C}} (\text{B}) \xrightarrow{800^\circ\text{C}} (\text{C}) + (\text{D})$
 - $\text{AgNO}_3 \xrightarrow{\text{Red hot}} (\text{E}) + (\text{F}) + \text{O}_2$
18. Identify (A), (B), (C) & (D) and give their chemical formulae :
- $(\text{A}) + \text{NaOH} \xrightarrow{\text{Heat}} \text{NaCl} + \text{NH}_3 + \text{H}_2\text{O}$
 - $\text{NH}_3 + \text{CO}_2 + \text{H}_2\text{O} \longrightarrow (\text{B})$
 - $(\text{B}) + \text{NaCl} \longrightarrow (\text{C}) + \text{NH}_4\text{Cl}$
 - $(\text{C}) \xrightarrow{\text{Heat}} \text{Na}_2\text{CO}_3 + \text{H}_2\text{O} + (\text{D})$
19. A certain metal (A) is boiled in dilute HNO_3 to give a salt (B) and an oxide of nitrogen (C). An aqueous solution of (B) with brine gives a precipitate (D) which is soluble in NH_4OH . On adding aqueous solution of (B) to hypo solution, a white precipitate (E) is obtained. (E) turns black on standing. Identify (A) to (E).

20. Calcium burns in nitrogen to produce a white powder which dissolves in sufficient water to produce a gas (A) and an alkaline solution. The solution on exposure to air produces a thin solid layer of (B) on the surface. Identify the compounds (A) and (B).
21. Gradual addition of KI solution to $\text{Bi}(\text{NO}_3)_3$ solution initially produces a dark brown precipitate which dissolves in excess of KI to give a clear yellow solution. Write equations for the above reactions.

CONCEPTUAL	SUBJECTIVE	EXERCISE	ANSWER KEY	EXERCISE -4(A)
1. (A) - NH_4NO_3	(B) - NH_3	(C) - ($\text{NaNO}_3 + \text{NaOH}$)	(D) - N_2O	(E) - H_2O
2. (A) - $\text{Cu}(\text{NO}_3)_2, \text{H}_2\text{O}$	(B) - NO_2, O_2	(C) - $[\text{Cu}(\text{NH}_3)_4]\text{SO}_4 + \text{H}_2\text{O}$	(D) - $\text{Ag}(\text{NH}_3)_2\text{Cl} + \text{H}_2\text{O}$	
3. $\text{Au} + 3[\text{Cl}] \longrightarrow \text{AuCl}_3 \xrightarrow{\text{HCl}} \text{H}[\text{AuCl}_4]$				
4. (i) - S, H_2O	(ii) - $\text{FeCl}_2, \text{HCl}, \text{H}_2\text{O}$	(iii) - Na_2S_5		
5. (A) - Na_2SO_3	(B) - SO_2			
6. (A) - AgCl ,	(B) - CuS (Black ppt.)	(C) - CaCO_3		
7. $\text{X} \rightarrow \text{SO}_2$	8. Ions of group I and III are present.			
9. $\text{X} \rightarrow \text{ZnCl}_2$	10. (A) - $(\text{NH}_4)_2\text{Cr}_2\text{O}_7$,	(B) - N_2 ,	(C) - Cr_2O_3 ,	(D) - 2NH_3
11. $\text{X} \rightarrow \text{NH}_4\text{NO}_3$, Y - NH_3	12. $\text{X} \rightarrow \text{Cr}(\text{OH})_3$, Y $\rightarrow \text{Cr}_2\text{O}_3$, Z $\rightarrow \text{Na}_2\text{CrO}_4$			
13. A - AlBr_3	14. (A) - CrO_4^{-2} , (B) - $\text{Cr}_2\text{O}_7^{-2}$, (C) - CrO_5 , (D) - CrO_2Cl_2			
15. X - NH_4NO_3 , Y - NH_3	16. $\text{X} \rightarrow \text{NH}_3$			
17. (A) - $\text{CuSO}_4 \cdot \text{H}_2\text{O}$,	(B) - CuSO_4 ,	(C) - CuO ,	(D) - SO_3 ,	(E) - Ag, (F) - NO_2
18. (A) - NH_4Cl ,	(B) - NH_4HCO_3 ,	(C) - NaHCO_3 ,	(D) - CO_2	
19. (A) - Ag,	(B) - AgNO_3 ,	(C) - NO,	(D) - AgCl	(E) - $\text{Ag}_2\text{S}_2\text{O}_3$
20. (A) - NH_3 ,	(B) - CaCO_3			
21. $\text{Bi}(\text{NO}_3)_3 + 3\text{KI} \longrightarrow \text{BiI}_3 \downarrow + 3\text{KNO}_3$,	$\text{BiI}_3 + \text{KI} \longrightarrow \text{K}[\text{BiI}_4]$			

EXERCISE-04 [B]

BRAIN STORMING SUBJECTIVE EXERCISE

1. A mixture of two white substances is soluble in water. This solution gives brown colour gas on passing chlorine gas. Another sample of solution gives white precipitate with BaCl_2 which is insoluble in concentrated HCl . The original solution of the mixture gives white precipitate with large excess of NaOH solution whose suspension is used as an antacid. After filtering off this precipitate, the filtrate was boiled with excess NaOH . solution gave a yellowish precipitate on adding NaClO_4 . One of the compound of the mixture forms alum. Identify the mixture.
2. An inorganic compound (A), transparent like glass is a strong reducing agent. Its hydrolysis in water gives a white turbidity (B). Aqueous solution of (A) gives white precipitate (C) with NaOH (aq) which is soluble in excess NaOH . (A) reduces auric chloride to produce purple of cassius. (A) also reduces I_2 and gives chromyl chloride test. Identify A, B, C & write balance reaction.
3. A unknown inorganic compound (X) gave the following reaction :
 - (i) on heating 'X' gave a residue, oxygen and oxide of nitrogen.
 - (ii) Addition of acetic acid and $\text{K}_2\text{Cr}_2\text{O}_7$ to its aqueous solution give a yellow precipitate.
 - (iii) Addition of NaOH to its aqueous solution first forms a white precipitate, Dissolve in the excess of the reagent.Identify the compound (X) and write balanced equation for step (i), (ii) & (iii).
4. A solution of white solid (A) gave white precipitate (B) with water. On treatment with HCl , the ppt. B produced A. The solution of A gives black precipitate (C) on reacting with sodium stannite and NaOH . The compound A gives a colourless gas (D) with concentrated H_2SO_4 . The gas is soluble in water and its aqueous solution produce with it precipitate with $\text{Hg}_2(\text{NO}_3)_2$ but no precipitate with $\text{Hg}(\text{NO}_3)_2$. Identify (A) to (D) and write the chemical reactions involved.
5. A mixture of three gases A, B and C is passed first into acidified $\text{K}_2\text{Cr}_2\text{O}_7$ solution when A is absorbed turnign the solution green. The remainder of the gas is passed through excess of lime water which turns milky resulting in the absorption of B. The residual gas C is absorbed by alkaline pyrogallol solution. However the original mixture does not turn lead acetate paper black. Identify A, B & C (Give necessary equations).
6. An unknown inorganic compound (X) gave the following reactions.
 - (i) The compound (X) on heating gave a residue, Oxygen and oxide of nitrogen.
 - (ii) An aqueos solution of compound (X) on addition to tap water gave a turbidity which did not dissolved in HNO_3
 - (iii) The turbidity dissolved in NH_4OH .Identify the compound (X) and give equations for the reactions (i), (ii) and (iii)
7. An unknown inorganic compound (X) loses its water of crystallisation. On heating its aqueous solution gives the following reaction :
 - (i) It gives a white turbidity with dilute HCl solution.
 - (ii) It decolourises a solution of iodine in KI .
 - (iii) It gives a white precipitate with AgNO_3 solution which turns black on standing.Identify compound (X) and give chemical equations for the reactions at step (i), (ii) & (iii).

8. A certain inorganic compound (A) on heating loses water of crystallisation. On further heating a blackish brown powder (B) and two oxides of sulphur (C & D) are obtained. The powder (B) on boiling with HCl gives a yellow solution (E). When H_2S is passed in (E) a white turbidity (F) and an apple green solution (G) is obtained. The solution (E) on treatment with thiocyanate ion gives blood red compound (H). Identify (A) to (H).
9. A black coloured compound (A) on reaction with dilute H_2SO_4 gives a gas (B) which on passing in a solution of an acid (C) gives a white turbidity (D). Gas (B) when passed in an acidified solution of a compound (E) gives a precipitate (F) soluble in dil HNO_3 . After boiling this solution when an excess of NH_4OH is added, a blue coloured compound (G) is formed. To this solution on addition of acetic acid and aqueous $\text{K}_4[\text{Fe}(\text{CN})_6]$ a chocolate precipitate (H) is obtained. On addition of an aqueous solution of BaCl_2 to an aqueous solution of (E), a white precipitate insoluble in HNO_3 is obtained. Identify (A) to (H).
10. On the basis of following reaction, Identify (A), (B), (C) & (D) and write down their chemical formulae ?
- (i) $(\text{A})_{\text{aqueous}} + \text{Zn} \xrightarrow{\text{heat}} (\text{B})_{\text{gas}}$
- (ii) $(\text{A})_{\text{aqueous}} + (\text{C}) \xrightarrow{\text{heat}} \text{PH}_3_{\text{gas}}$
- (iii) $(\text{A})_{\text{aqueous}} + \text{NH}_4\text{Cl} \xrightarrow{\text{heat}} (\text{D})_{\text{gas}}$
11. An aqueous solution of an unknown compound (X) gives the following reactions.
- (i) It gives brown precipitate with alkaline KMnO_4 solution
- (ii) It forms HCl & evolved O_2 when reacts with Cl_2 gas.
- (iii) It liberates I_2 from an acidified KI solution.
- (iv) It gives orange yellow colour with acidified titanous sulphate solution.
- Identify (X) and give the chemical equations for the reactions (i), (ii) & (iii).
12. An aqueous solution of inorganic compound (X) gives following reactions.
- (i) With an aqueous solution of BaCl_2 a precipitate insoluble in dilute HCl is obtained.
- (ii) Addition of excess of KI gives a brown appearance which turns white on addition of excess of hypo.
- (iii) With an aqueous solution of $\text{K}_4\text{Fe}(\text{CN})_6$ a chocolate coloured precipitate is obtained.
- Identify (X) and give equations for the reactions for (i), (ii) & (iii) observations.
13. An inorganic compound (X) gives brick red flame on performing the flame test. This also give the following tests :
- (i) Smell of chlorine when placed in moist air.
- (ii) If KI & CH_3COOH are added to its suspension in water, a brown colour is obtained. Identify (X) and write down equations for reactions at step (i) and (ii).
14. Two solid laboratory reagents (A) and (B) give following reactions :
- Compound : (A)
- (i) On strongly heating it gives two oxides of sulphur.
- (ii) On adding aqueous NaOH solution to its aqueous solution, a dirty green precipitate is obtained which starts turning brown on exposure to air.

Compound : (B)

(i) It imparts green colour to flame.

(ii) Its solution doesn't give precipitate on passing H_2S

(iii) When it is heated with $\text{K}_2\text{Cr}_2\text{O}_7$ & conc. H_2SO_4 , a red gas is evolved. The gas when passed in aqueous NaOH solution turns it yellow.

Identify (A) to (B) and give chemical reactions.

15. The gas liberated on heating a mixture of two salts with NaOH, give a reddish brown precipitate with an alkaline solution of K_2HgI_4 . The aqueous solution of the mixture on treatment with BaCl_2 gives a white precipitate which is sparingly soluble in concentrated HCl. On heating the mixture with $\text{K}_2\text{Cr}_2\text{O}_7$ and concentrated H_2SO_4 , red vapour (A) are produced. The aqueous solution of the mixture gives a deep blue ppt (B) with potassium ferricyanide solution. Identify the radicals.

16. When 16.8 g of white solid X was heated 4.4 g of acid gas : (A) that turned lime water milky was driven off together with 1.8 g of a gas (B) which condensed to a colourless liquid the solid that remained (Y) dissolved in water to give an alkaline solution, which with excess of BaCl_2 solution gave a white precipitate (Z). The precipitate effervesces with acid giving of CO_2 gas. Identify the compound A, B & Y and write the chemical equations for the thermal decomposition of X.

17. A metal chloride (X) shows the following reactions :

(i) When H_2S is passed in an acidified aqueous solution of (X) a black ppt is obtained.

(ii) The precipitate obtained in step (i) is not soluble in yellow ammonium sulphide.

(iii) When a solution of stannous chloride is added to an aqueous solution of (X), a white precipitate is obtained which turns grey on addition of more of stannous chloride.

(iv) When an aqueous solution of KI is added to an aqueous solution of (X), a red precipitate is obtained which dissolves on addition of excess of KI.

Identify (X) and write down the equations for the reaction at steps (i), (iii) & (iv)

18. On mixing the aqueous solutions of compounds (A) and (B), an insoluble compound (C) is produced along with another water soluble compound (D). Compound (A) on heating gives brown NO_2 gas with a cracking noise. An aqueous solution of compound (A) gives black ppt. With H_2S gas. Compound (A) also gives white ppt. with dil. HCl which is soluble in hot water and reappears on cooling. The hot water extract of compound (A) gives yellow ppt. with K_2CrO_4 solution.

19. A Colourless crystalline compound (A) is warmed with Al and NaOH solution gives a gas which produces fumes with HCl, brown ppt. when passed through Nessler's reagent and is oxidised to a colourless gas when passed over heated CuO. The latter does not support combustion, however, Mg continues burning in it producing white solid. The compound (A) when heated alone gives a brown coloured gas and another gas (B) which is essential for living beings, leaving behind a yellow solid (C). The solid (C) gives the following reactions.

(i) It dissolves in dil. HNO_3 giving a colourless solution which gives white ppt. on addition of dilute HCl which is soluble in hot and reappears on cooling.

(ii) When heated in presence of air, the yellow solid (C) changes to red powder. Identify (A), (B) and (C), giving the equations involved.

20. An inorganic halide (A) gives the following reactions :

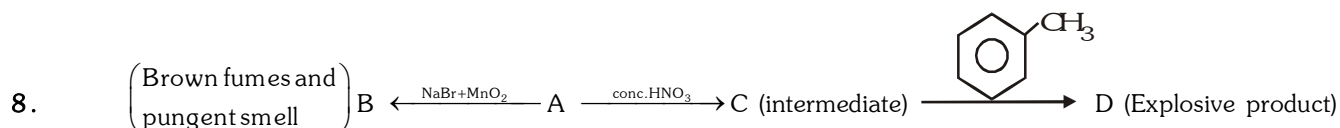
- (i) The cation of (A) on reaction with H_2S in HCl medium, gives a black ppt. of (B). (A) neither gives ppt. with HCl nor blue colour with $\text{K}_4\text{Fe}(\text{CN})_6$.
- (ii) (B) on heating with dil. HCl gives back compound (A) and a gas (C) which gives a black ppt. With lead acetate solution.
- (iii) The anion of (A) gives chromyl chloride test.
- (iv) (B) dissolves in hot dil. HNO_3 to give a solution, (D). (D) gives ring test.
- (v) When NH_4OH solution is added to (D), a white precipitate (E) is formed. (E) dissolves in minimum amount of dil. HCl to give a solution of (A). Aqueous solution of (A) on addition of water gives a whitish turbidity (F).
- (vi) Aqueous solution of (A) on warming with alkaline sodium stannite gives a black precipitate of a metal (G) and sodium stannate. The metal (G) dissolves in hydrochloric acid to give solution of A.

Identify (A) to (G) and give balanced chemical equations of reactions

CONCEPTUAL SUBJECTIVE EXERCISE		ANSWER KEY		EXERCISE -4(B)
1. Mixture consists - K_2SO_4 and MgBr_2				
2. (A) - SnCl_2	(B) - $\text{Sn}(\text{OH})\text{Cl}$	(C) - $\text{Sn}(\text{OH})_2$	3. $\text{X} \rightarrow \text{Pb}(\text{NO}_3)_2$	
4. (A) - BiCl_3	(B) - BiOCl	(C) - Bi	(D) - H_2SO_4	
5. (A) - SO_2	(B) - CO	(C) - O_2		
6. $\text{X} \rightarrow \text{AgNO}_3$				
7. $\text{X} \rightarrow \text{Na}_2\text{S}_2\text{O}_3 \cdot 5\text{H}_2\text{O}$				
8. (A) - $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$	(B) - Fe_2O_3	(C) - SO_2	(D) - SO_3	
(E) - FeCl_3	(F) - S	(G) - FeCl_2	(H) - $\text{Fe}(\text{CNS})_3$	
9. (A) - FeS	(B) - H_2S	(C) - HNO_3	(D) - S	
(E) - CuSO_4	(F) - CuS	(G) - $[\text{Cu}(\text{NH}_3)_4](\text{NO}_3)_2$	(H) - $\text{Cu}_2[\text{Fe}(\text{CN})_6]$	
10. (A) - NaOH	(B) - H_2	(C) - Phosphorous (P_4)	(D) - NH_4Cl	
11. $\text{X} \rightarrow \text{H}_2\text{O}_2$	12. $\text{X} \rightarrow \text{CuSO}_4$	13. $\text{X} \rightarrow \text{CaOCl}_2$		
14. (A) - FeSO_4	(B) - BaCl_2			
15. (A) - CrO_2Cl_2	(B) - $\text{Fe}_3[\text{Fe}(\text{CN})_6]_2$			
16. (A) - CO_2	(B) - H_2O	$\text{X} \rightarrow \text{Na}_2\text{CO}_3$		
17. $\text{X} \rightarrow \text{HgCl}_2$				
18. (A) - $\text{Pb}(\text{NO}_3)_2$	(B) - FeSO_4	(C) - PbSO_4	(D) - $\text{Fe}(\text{NO}_3)_2$	
19. (A) - $\text{Pb}(\text{NO}_3)_2$	(B) - O_2	(C) - Pb_3O_4		
20. (A) - BiCl_3	(B) - Bi_2S_3	(C) - H_2S	(D) - $\text{Bi}(\text{NO}_3)_3$	
(E) - $\text{Bi}(\text{OH})_3$	(F) - BiOCl	(G) - Bi		

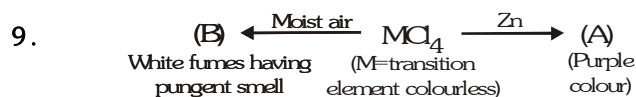
EXERCISE-05**PREVIOUS YEARS QUESTIONS****SUBJECTIVE QUESTIONS**

1. An aqueous blue coloured solution of a transition metal sulphate reacts with H_2S in acidic medium to give a black precipitate (A) which is insoluble in warm aqueous solution of KOH . The blue solution on treatment with KI in weakly acidic medium turns yellow and produces a white precipitate (B). Identify the transition metal ion. Write the chemical reaction involved in the formation of (A) and (B). [JEE 2000]
2. (i) A powdered substance (A) on treatment with fusion mixture gives a green coloured compound (B).
(ii) The solution of (B) in boiling water on acidification with dilute H_2SO_4 gives a pink coloured compound (C)
(iii) The aqueous solution of (A) on treatment with NaOH and Br_2 water gives a compound (D).
(iv) A solution of (D) in conc. HNO_3 on treatment with lead peroxide at boiling temperature produced a compound (E) which was of the same colour as that of (C).
(v) A solution of (A) in dilute HCl on treatment with a solution of barium chloride gave a white precipitate of compound (F) which was insoluble in conc. HNO_3 and conc. HCl .
Identify (A) to (F) and give balanced chemical equations for the reactions at steps (i) to (v). [JEE -2001]
3. Identify the following :
- $$\text{Na}_2\text{CO}_3 \xrightarrow{\text{SO}_2} \text{A} \xrightarrow{\text{Na}_2\text{CO}_3} \text{B} \xrightarrow[\Delta]{\text{Elemental S}} \text{C} \xrightarrow{\text{I}_2} \text{D}$$
- Also mention the oxidation state of S in all the compounds. [JEE -2002]
4. A mixture consists A (yellow solid) and B (colourless solid) which gives Lilac colour in flame.
(a) Mixture gives black precipitate C on passing H_2S (g).
(b) C is soluble in aqua-regia and on evaporation of aqua-regia and adding SnCl_2 gives greyish black precipitate D. The salt solution with NH_4OH gives a brown precipitate.
(i) The sodium extract of the salt with $\text{CCl}_4/\text{FeCl}_3$ gives a violet layer.
(ii) The sodium extract gives yellow precipitate with AgNO_3 solution which is insoluble in NH_3 .
Identify A and B, and the precipitates C and D. [JEE -2003]
5. Dimethyl glyoxime is added to alcoholic solution of NiCl_2 . When ammonium hydroxide is slowly added to it a rosy red precipitate of a complex appears.
(i) Give the structure of complex showing hydrogen bonds
(ii) Give oxidation state and hybridization of central metal ion.
(iii) Identify whether it is paramagnetic or diamagnetic. [JEE -2004]
6. There are two ores (A_1) and (A_2) of metal (M). When ore (A_1) is calcinated a black solid (S) is obtained along with the liberation of CO_2 and water. The ore (A_1) on treatment with HCl and KI gives a precipitate (P) and iodine is liberated. Another ore (A_2) on roasting gives a gas (G) and metal (M) is set free. When gas (G) is passed through $\text{K}_2\text{Cr}_2\text{O}_7$ it turns green. Identify (M), (A_1), (A_2), (S), (P) and (G). [JEE -2004]
7. $\text{Fe}^{3+} \xrightarrow{\text{SCN}^- (\text{excess})} \text{blood red (A)} \xrightarrow{\text{F}^- (\text{excess})} \text{colourless (B)}$
Identify (A) and (B)
(a) Write IUPAC name of A and B.
(b) Find out spin only magnetic moment of B [JEE -2005]



Find A, B, C and D. Also write equations A to B and A to C.

[JEE -2001]



Identify the metal M and hence MCl_4 . Explain the difference in colours of MCl_4 and A. [JEE -2005]

10. During the qualitative analysis of a mixture containing Cu^{2+} and Zn^{2+} ions, H_2S gas is passed through an acidified solution containing these ions in order to test Cu^{2+} alone. Explain. [IIT -98, 2M]

11. Write the chemical reactions associated with the 'brown ring test'. [JEE -2000]

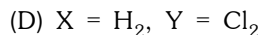
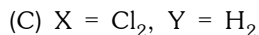
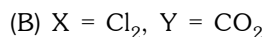
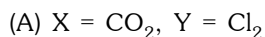
12. Write the chemical reaction associated with the 'borax bead test' of cobalt (II) oxide. [JEE -2000, 3M]

13. A white substance A reacts with dilute H_2SO_4 to produce a colourless gas B and a colourless solution C. The reaction between B and acidified $\text{K}_2\text{Cr}_2\text{O}_7$ solution produces a green solution and a slightly coloured precipitate D. The substance D burns in air to produce a gas E which reacts with B to yield D and a colourless liquid. Anhydrous copper sulphate is turned blue on addition of this colourless liquid. Addition of aqueous NH_3 or NaOH to C produces first a precipitate, which dissolves in the excess of the respective reagent to produce a clear solution in each case. Identify A, B, C, D and E. Write the equations of the reactions involved. [JEE-2001 10M]

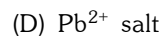
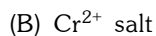
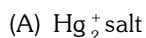
14. When a white crystalline compound X is heated with $\text{K}_2\text{Cr}_2\text{O}_7$ and concentrated H_2SO_4 , a reddish brown gas A is evolved. On passing A into caustic soda solution, a yellow coloured solution B is obtained. Neutralizing the solution of B with acetic acid and on subsequent addition of lead acetate a yellow precipitate C is obtained. When X is heated with NaOH solution, colourless gas is evolved and on passing this gas into K_2HgI_4 solution, a reddish brown precipitate D is formed. Identify A, B, C, D and X. Write the equations of reactions involved. [JEE -2002 5M]

MCQ's WITH ONE CORRECT ANSWER

15. A gas 'X' is passed through water to form a saturated solution. The aqueous solution on treatment with silver nitrate gives a white precipitate. The saturated aqueous solution also dissolves magnesium ribbon with evolution of a colourless gas 'Y'. Identify 'X' and 'Y': [JEE -2002]



16. An aqueous solution of a substance gives a white precipitate on treatment with dilute hydrochloric acid, which dissolves on heating. When hydrogen sulphide is passed through the hot acidic solution, a black precipitate is obtained. The substance is a - [JEE -2000]

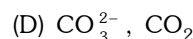
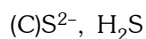
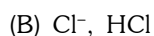
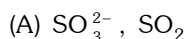


17. $[\text{X}] + \text{H}_2\text{SO}_4 \longrightarrow [\text{Y}]$ a colourless gas with irritating smell



[X] and [Y] are -

[JEE -2003]



18. A sodium salt of an unknown anion when treated with MgCl_2 gives white precipitate only on boiling. The anion is - [IIT -2004]
 (A) SO_4^{2-} (B) HCO_3^- (C) CO_3^{2-} (D) NO_3^-
19. 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 metal nitrate is - [IIT -2005]
 (A) Hg^{2+} (B) Bi^{3+} (C) Pb^{2+} (D) Cu^+
20. A solution when diluted with H_2O and boiled, it gives a white precipitate, On addition of excess $\text{NH}_4\text{Cl}/\text{NH}_4\text{OH}$, the volume of precipitate decreases leaving behind a white gelatinous precipitate. Identify the precipitate which dissolves in $\text{NH}_4\text{OH}/\text{NH}_4\text{Cl}$: [IIT -2006]
 (A) $\text{Zn}(\text{OH})_2$ (B) $\text{Al}(\text{OH})_3$ (C) $\text{Mg}(\text{OH})_2$ (D) $\text{Ca}(\text{OH})_2$
21. CuSO_4 decolourises on addition of KCN, the product is - [IIT -2006]
 (A) $[\text{Cu}(\text{CN})_4]^{2-}$
 (B) Cu^{2+} get reduced to form $[\text{Cu}(\text{CN})_4]^{3-}$
 (C) $\text{Cu}(\text{CN})_2$
 (D) CuCN
22. Aqueous solution of $\text{Na}_2\text{S}_2\text{O}_3$ on reaction with Cl_2 gives :- [IIT -2008]
 (A) $\text{Na}_2\text{S}_4\text{O}_6$ (B) NaHSO_4 (C) NaCl (D) NaOH

MCQ's WITH ONE OR MORE THAN ONE CORRECT ANSWER

23. The reagents, NH_4Cl and aqueous NH_3 will precipitate :- [1991, 1M]
 (A) Ca^{2+} (B) Al^{3+} (C) Bi^{3+} (D) Mg^{2+}
 (E) Zn^{2+}
24. Which of the following statement (s) is (are) correct with reference to the ferrous and ferric ions :- [1998, 2M]
 (A) Fe^{3+} gives brown colour with potassium ferricyanide
 (B) Fe^{2+} gives blue precipitate with potassium ferricyanide
 (C) Fe^{3+} gives red colour with potassium thiocyanate
 (D) Fe^{2+} gives brown colour with ammonium thiocyanate
25. The species present in solution when CO_2 is dissolved in water are :- [JEE-2006]
 (A) CO_2 , H_2CO_3 , HCO_3^- , CO_3^{2-}
 (B) H_2CO_3 , CO_3^{2-}
 (C) HCO_3^- , CO_3^{2-}
 (D) CO_2 , H_2CO_3
26. 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 - [JEE -2007]
 (A) Pb^{2+} (B) Hg^{2+}
 (C) Cu^{2+} (D) Co^{+2}
27. A solution of colourless salt H on boiling with excess NaOH produces a non-flammable gas. The gas evolution ceases after sometime. Upon addition of Zn dust to the same solution, the gas evolution restarts. The colourless salt(s) H is (are) :- [IIT -2008]
 (A) NH_4NO_3 (B) NH_4NO_2 (C) NH_4Cl (D) $(\text{NH}_4)_2\text{SO}_4$

MATCH THE COLUMN

28. Match the complexes in Column I with their properties listed in Column II. Indicate your answer by darkening the appropriate bubbles of the 4 × 4 matrix given in the ORS. [JEE-2007]

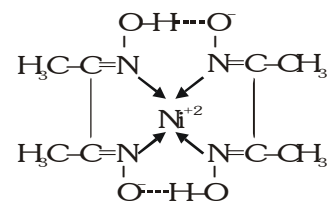
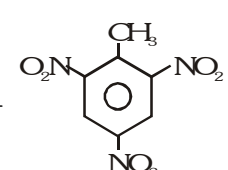
<u>Column-I</u>		<u>Column-II</u>	
(A)	$\text{O}_2^- \rightarrow \text{O}_2 \rightarrow \text{O}_2^{2-}$	(p)	redox reaction
(B)	$\text{CrO}_4^{2-} + \text{H}^+ \rightarrow$	(q)	One of the products has trigonal planar structure
(C)	$\text{MnO}_4^- + \text{NO}_2^- + \text{H}^+ \rightarrow$	(r)	Dimeric bridged tetrahedral metal ion
(D)	$\text{NO}_3^- + \text{H}_2\text{SO}_4 + \text{Fe}^{2+} \rightarrow$	(s)	disproportionation

29. **Statement-I** : $[\text{Fe}(\text{H}_2\text{O})_5\text{NO}]\text{SO}_4$ is paramagnetic. [IIT -2008]

Because

Statement-II : The Fe in $[\text{Fe}(\text{H}_2\text{O})_5\text{NO}]\text{SO}_4$ has three unpaired electrons.

- (A) Statement-I is True, Statement-II is True; Statement-II is a correct explanation for Statement-I
(B) Statement-I is True, Statement-II is True; Statement-II is **NOT** a correct explanation for Statement-I
(C) Statement-I is True, Statement-II is False
(D) Statement-I is False, Statement-II is True

CONCEPTUAL SUBJECTIVE EXERCISE		ANSWERS		EXERCISE - 5	
1. (A) - CuS		(B) - Cu ₂ I ₂			
2. (A) - MnSO ₄		(B) - Na ₂ MnO ₄		(C) - NaMnO ₄	(D) - MnO ₄
(E) - HMnO ₄		(F) - BaSO ₄			
3. A - NaHSO ₃		(B) - Na ₂ SO ₃	(C) - Na ₂ S ₂ O ₃	(D) - Na ₂ S ₄ O ₆	
4. (A) - HgI ₂		(B) - KI	(C) - HgS	(D) - Hg	
<div>5. (i) </div>					
		(ii) Hybridisation - dsp ² ,		(iii) Magnetic moment = 0, Diamagnetic	
6. A ₁ - CuCO ₃ ·Cu(OH) ₂ (Malachite)					
A ₂ - Cu ₂ S (Copper glance)					
S - CuO					
P - Cu ₂ I ₂					
G - SO ₂ ↑					
7. A - [Fe(SCN)(H ₂ O) ₅] ²⁺ (Pentaaquathiocyanato-S-iron (III) ion), Magnetic moment = $\sqrt{35}$					
B - [FeF ₆] ³⁻ (hexafluoroferrate (III) ion), Magnetic moment = $\sqrt{35}$					
8. (A) - conc. H ₂ SO ₄					
(B) - Br ₂					
(C) - NO ₂ ⁺					
(D) -  (Explosive)					
9. (A) - [Ti(H ₂ O) ₆] ³⁺					
(B) - HCl, MCl ₄ - TiCl ₄ (Purple colour of [Ti(H ₂ O) ₆] ³⁺ is due to d-d transition)					
10. Hint :- K _{sp} (solubility product) of CuS is less than K _{sp} of ZnS.					
11. Hint :- [Fe(NO)SO ₄]					
(Brown ring) (Ferrous nitroso sulphate)					
12. Hint :- CO(BO ₂) ₂ [Cobalt metaborate (Blue colour)]					
13. (A) - ZnS					
(B) - H ₂ S					
(C) - ZnSO ₄					
(D) - S					
(E) - SO ₂					
14. X → NH ₄ Cl,					
(A) - CrO ₂ Cl ₂					
(B) - Na ₂ CrO ₄					
(C) - PbCrO ₄					
(D) - NH ₄ (HgO)HgI					
15. (C)					
16. (D)					
17. (A)					
18. (B)					
19. (B)					
20. (A)					
21. (D)					
22. (B)					
23. (B), (C)					
24. (B), (C)					
25. (A)					
26. (B)					
27. (A,B)					
28. (A) - p,s (B) - r, (C) - p, q, (D) - p, s					
29. (A)					