



**CHEMISTRY**

Note: For all the questions in the paper, marks will be awarded as per the following scheme  
(a) +3 marks for correct answers.  
(b) -1 mark for wrong answers.  
(c) zero marks if the option is left blank

Atomic Masses : Ag = 108, Hg = 200.8, N = 14, O = 16, Pt = 194, Au = 197

Questions 1—5 are based upon the following problem. Read this problem and answer the following questions :

The analysis laboratory received a white crystalline material for analysis. The analyst weighed out two samples of the material.

**Sample 1.** with a mass of 1.084 g was dissolved in water. As the material dissolved 26.17 ml of gas, having a mass of 37.39 mg, was released. The resulting solution was found to be very acidic. Addition hydrochloric acid caused a precipitate to form. After addition of 47.5 ml 0.0983 molar HCl no more precipitate was formed. The precipitate was recovered, dried and weighed. The mass of precipitate obtained was 0.6693 g.

**Sample 2** with a mass of 1.120 g was heated to above 300° C. During heating 324.6 ml of a gas, with a mass of 599.0 mg, was collected. After heating a light colored metal with a mass of 0.521 g remained. The gas was dissolved in 100 ml of water. Not all the gas dissolved, 54.10 ml, with a mass of 77.2 mg, remained. The pH of the solution was found to be 1.015.

**Questions**

- Which kind of a substance will release a gas and make the solution acidic when it is dissolved in water ?**  
(A) A substance that reduces water and liberates hydrogen gas.  
(B) A substance that oxidises water and liberates oxygen gas.  
(C) A substance that is conjugate acid of a very poor base.  
(D) A substance that is conjugate base of a very poor acid.
- A white ppt with dil. HCl indicates the presence of**  
(A)  $\text{Hg}^{2+}$                       (B)  $\text{Ag}^{2+}$                       (C)  $\text{Mg}^{2+}$                       (D)  $\text{Ag}^+$
- The gas liberated from Sample—1 is**  
(A)  $\text{O}_2$                       (B)  $\text{H}_2$                       (C)  $\text{PH}_3$                       (D)  $\text{CrO}_2\text{Cl}_2$
- The gas liberated from Sample—2 is**  
(A) Only  $\text{O}_2$                       (B) Only  $\text{H}_2$                       (C)  $\text{O}_2$  and  $\text{NO}_2$                       (D)  $\text{H}_2$  and  $\text{NH}_3$
- The original substance was**  
(A)  $\text{Ag}(\text{NO}_3)_2$                       (B)  $\text{AuNO}_3$                       (C)  $\text{PH}_4\text{HCrO}_4$                       (D)  $\text{PH}_4[\text{AlH}(\text{t}-\text{O}-\text{C}(\text{CH}_3)_3)_3]$

### Single correct answers (Q 6-35)

6. A substance 'A' produces a white precipitate with NaOH, soluble in excess NaOH giving 'B'. 'A' produces green colour with  $K_2Cr_2O_7$ . 'B' when added to 'C' produces a yellowish precipitate which turns brown then black. 'A' & 'C' could be  
 (A)  $Na_2S_2O_3$  and  $AgNO_3$  (B)  $AgNO_3$  and  $Na_2S_2O_3$   
 (C)  $ZnCl_2$  and  $SOCl_2$  (D)  $ZnS_2O_3$  and  $HgCl_2$
7. When  $H_2S$  is passed through mercurous nitrate a black precipitate is obtained. This precipitate when treated with a substance 'A' dissolves completely. 'A' when mixed with 'B' produces blood red colouration on addition of 'C'. It is given that  $Hg^{2+}$  forms a soluble complex ( $HgS_2^{2-}$ ) with sulphide ions. Then
- |     | <b>A</b>        | <b>B</b> | <b>C</b>       |
|-----|-----------------|----------|----------------|
| (A) | $HNO_3$ (conc.) | $OCl_2$  | KI             |
| (B) | $Na_2S$         | NaCN     | $FeCl_3$       |
| (C) | $Na_2S_2$       | KCN      | $Fe_2(SO_4)_3$ |
| (D) | $HNO_3$ (conc.) | S        | $FeCl_3$       |
8. A transient violet colouration may be obtained by mixing  
 (A)  $K_2S$  and KI (B)  $Na_2S$ ,  $Na_2SO_3$  and  $Fe^{3+}$  (acidified)  
 (C)  $Na_2S$  and  $Na_2[Fe(CN)_5NO]$  (D)  $Na_2S$ ,  $Na_2SO_3$  and  $Fe^{3+}$  (neutral)
9. Which of the following sulphides ( $S^{2-}$ ) will dissolve in KCN solution  
 (A) CdS (B) CuS (C) ZnS (D) HgS
10. Solution of a substance 'A' when added on a substances 'B' gives a grey deposit which appears shiny on rubbing carefully. (A) it could be :
- |     | <b>A</b>     | <b>B</b> |
|-----|--------------|----------|
| (A) | $CuSO_4$     | Hg       |
| (B) | $HgCl_2$     | Cu       |
| (C) | $HgCl_2$     | $CuSO_4$ |
| (D) | $Bi(NO_3)_3$ | Ag       |
11. (A) with addition of KSCN gives black precipitate which in presence of  $NaHSO_3$  turns white. (A) could be  
 (A)  $CuSO_4$  (B)  $Co(CH_3COO)_2$  (C)  $SnCl_2$  (D)  $HgCl_2$
12. Which of the following sulphides could dissolve in NaOH (excess)  
 (A) CuS (B) SnS (C)  $SnS_2$  (D) HgS
13. Which of the following ions when added to aq.  $Bi(NO_3)_3$  will produce a precipitate which dissolves on addition of excess reagent  
 (A) KI (B) NaCl (C)  $NH_3$  (D) KOCN
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14. Addition of NaOH gives white precipitates with (A) as well as (B). The precipitates are soluble in excess NaOH. Addition of a drop of  $K_2Cr_2O_7$  produces a yellowish colour in (A) & greenish colour in (B). A and B could be  
 (A)  $ZnCl_2$                        $PbCl_2$                       (B)  $SnCl_2$                        $ZnCl_2$   
 (C)  $Zn(OC_6H_5)_2$                $SnCl_2$                       (D)  $ZnCl_2$                        $SnCl_2$
15. A colourless solution gives an orange precipitate on addition of NaOCl. It could be  
 (A)  $BiI_4^-$                       (B)  $K_2HgI_4$                       (C)  $HAuCl_4$                       (D)  $Sb_2O_3$
16. Addition of a substance 'A' produces a little precipitate with  $AgNO_3$ . The filtrate gives yellow precipitate with KI insoluble in aq.  $NH_3$ . The original substance produced no precipitate with chlorides of Ba, Mg or Cu. (A) could be  
 (A)  $Cr(ClO_4)_3$                       (B)  $FeCl_3$                       (C)  $FeCl_2$                       (D)  $NaNO_2$
17. Which substance produces a greenish precipitate with NaOH as well as  $K_4Fe(CN)_6$   
 (A)  $FeSO_4$                       (B)  $CoSO_4$                       (C)  $NiSO_4$                       (D)  $CuSO_4$
18. A substance 'A' produces red precipitate with  $HgCl_2$  and white precipitate with  $CuCl_2$ . It could be  
 (A)  $Pb(NO_3)_2$                       (b)  $Na_2CO_3$                       (C)  $K_2SO_4$                       (D)  $MgI_2$
19. Addition of excess  $Ba(OH)_2$  to  $H_3PO_3$  will can produce  
 (A)  $Ba(H_2PO_3)_2$                       (B)  $BaHPO_3$                       (C)  $Ba(HPO_3)_2$                       (D)  $Ba_3(PO_3)_2$
20. Which of the following solutions will give effervescence when added to  $CaCO_3(s)$ ?  
 (A) NaCl                      (B)  $Ca(OH)_2$                       (C) HCl                      (D)  $H_2C_2O_4$
21. Drops of conc. nitric acid react with  $P_4O_{10}$  to give  
 (A) NO                      (B)  $NO_2$                       (C)  $N_2O_5$                       (D) None of these
22. A heavy metal chloride gives white turbidity when dissolved in water. The turbidity dissolves in conc. HCl but reappears on dilution. The turbidity also dissolves in potassium hydrogen tartarate. The metal chloride is  
 (A)  $BiCl_3$                       (B)  $SbCl_3$                       (C)  $FeCl_3$                       (D)  $SnCl_2$
23. In spite of being insoluble even in conc. HCl, metallic copper easily dissolves in dil.  $HNO_3$ . Which of the following is correct for this reaction?  
 (A) copper is oxidized by nitric acid                      (B) copper is reduced by dil. HCl  
 (C)  $NO_2$  is formed                      (D)  $HNO_3$  is stronger acid than HCl
24. A piece of chalk will not dissolve completely in aqueous solution of which of the following?  
 (A) HCl                      (B)  $H_2SO_4$                       (C)  $HNO_3$                       (D)  $CH_3COOH$
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25.  $\text{SO}_2$  is passed in potassium dichromate solution. The colour of solution changes from  
(A) orange to black (B) orange to red  
(C) orange to yellow (D) orange to green
26. Sodium azide is produced by  
(A) passing nitrous oxide through sodamide  
(B) oxidising ammonia by sodium hypochlorite  
(C) bubbling activated nitrogen through molten sodium nitride  
(D) reducing sodium nitrate by carbon
27. Reaction of calcium carbide with nitrogen at high temperature yields  
(A) calcium cyanide (B) calcium nitride  
(C) calcium nitroprusside (D) calcium cyanamide
28. Which of the following oxides of potassium will not be may possibly formed when different amounts of oxygen are passed through a solution of potassium in liq. ammonia?  
(A)  $\text{K}_2\text{O}_2$  (B)  $\text{KO}_2$  (C)  $\text{K}_2\text{O}_3$  (D)  $\text{KO}_3$
29. A greenish substance when heated with NaOH produces a green ppt which shows no change on addition of conc.  $\text{H}_2\text{O}_2$ . The green precipitate fails to dissolve in excess NaOH and is stable towards air. It could be  
(A)  $\text{Ni}(\text{NO}_3)_2$  (B)  $\text{FeSO}_4$  (C)  $\text{Cr}_2(\text{SO}_4)_3$  (D) Mohr's salt
30. Which of the following is high spin and square planar complex?  
(A)  $[\text{Mn}(\text{C}_2\text{O}_4)_3]^{3-}$  (B)  $\text{MnF}_4^-$  (C)  $[\text{Ni}(\text{CN})_4]^{2-}$  (D)  $\text{NiF}_4^{2-}$
31. In which case is the coordination sphere low spin and tetrahedral?  
(A)  $\text{Ni}(\text{CO})_4$  (B)  $\text{K}_2[\text{Zn}(\text{CN})_4]$  (C)  $\text{K}_2[\text{Pt}(\text{CN})_4]$  (D)  $\text{Fe}(\text{CO})_5$
32. Assuming that this complex obeys EAN rule, what is the formula for a carbonyl complex of Mn,  $(\text{CO})_x\text{Mn}-\text{Mn}(\text{CO})_x$  Mn—Mn $(\text{CO})_x$  where there is a single covalent bond between the two Mn atoms  
(A)  $\text{Mn}_2(\text{CO})_{10}$  (B)  $\text{Mn}_2(\text{CO})_8$  (C)  $\text{Mn}_2(\text{CO})_{12}$  (D) none of the above
33. Which of the following cations is colorless?  
(A)  $[\text{Cu}(\text{H}_2\text{O})_6]^{2+}$  (B)  $[\text{Fe}(\text{H}_2\text{O})_6]^{3+}$  (C)  $[\text{Cd}(\text{H}_2\text{O})_6]^{2+}$  (D)  $[\text{Cr}(\text{H}_2\text{O})_6]^{2+}$
34. Addition of which of the following will best separate the cations from an aqueous solution of  $\text{Mg}(\text{ClO}_4)_2$  and  $\text{AgNO}_3$ ?  
(A)  $\text{Na}_2\text{SO}_4$  (B)  $\text{Na}_2\text{CO}_3$  (C)  $\text{Na}_2\text{C}_2\text{O}_4$  (D) KSCN
35. Which of the following will produce white / yellow turbidity when bubbled through  $\text{Na}_2\text{PbO}_3(\text{aq.})$   
(a)  $\text{Br}_2$  (b)  $\text{Cl}_2$  (c)  $\text{H}_2\text{S}$  (d)  $\text{SO}_2$
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## Exactly two correct answers (Q 36-45)

36. 'A' when added to NaOCl produces a brown precipitate. A could be  
(A)  $\text{MgCl}_2$  (B)  $\text{Pb}(\text{NO}_3)_2$  (C)  $\text{SnCl}_2$  (D)  $\text{Mn}(\text{NO}_3)_2$
37. P + Q gives a green precipitate. They could be  
(A)  $\text{CuSO}_4 + \text{K}_4[\text{Fe}(\text{CN})_6]$  (B)  $\text{CuSO}_4 + \text{K}_3[\text{Fe}(\text{CN})_6]$   
(C)  $\text{CoSO}_4 + \text{K}_4[\text{Fe}(\text{CN})_6]$  (D)  $\text{FeSO}_4 + \text{K}_4[\text{Fe}(\text{CN})_6]$
38. Addition of dil.  $\text{H}_2\text{SO}_4$  would turn the solution (colourless) white if the solution contains  
(A)  $\text{CuSO}_4$  (B)  $\text{Na}_2\text{S}$   
(C)  $\text{Na}_2\text{S}_2$  (D) Yellow ammonium sulphide  $(\text{NH}_4)_2\text{S}_n$
39. Addition of aq.  $\text{NH}_3$  to a solution produces white precipitate. insoluble in excess  $\text{NH}_3$ . The solution contains  
(A)  $\text{Bi}(\text{NO}_3)_3$  (B)  $\text{Pb}(\text{NO}_3)_2$  (C)  $\text{CdSO}_4$  (D)  $\text{AgNO}_3$
40. A substance gives a white precipitate with NaOH which is soluble in excess NaOH. The substance could be  
(A)  $\text{AgNO}_3$  (B)  $\text{HgCl}_2$  (C)  $\text{Pb}(\text{NO}_3)_2$  (D)  $\text{SnCl}_2$
41. Addition of excess potassium cyanide will dissolve which of the following without any change in their oxidation state.  
(A)  $\text{CdSO}_4$  (B)  $\text{CuSO}_4$  (C)  $\text{AgNO}_3$  (D)  $\text{CaCl}_2$
42. Appearance of a red precipitate when a substance 'A' is added to  $\text{K}_2\text{CrO}_4$  indicates the presence of  
(A)  $\text{AgNO}_3$  (B)  $\text{HgCl}_2$  (C)  $\text{Hg}_2(\text{NO}_3)_2$  (D)  $\text{Pb}(\text{CH}_3\text{COO})_2$   
(E)  $\text{PbS}$
43. Which of the following will leave no solid residue (i.e. from entirely gaseous products) when heated strongly?  
(A)  $\text{Ca}(\text{NO}_3)_2$  (B)  $\text{NH}_4\text{NO}_2$  (C)  $\text{NH}_4\text{NO}_3$  (D)  $\text{Mg}(\text{NH}_4)\text{PO}_4$
44. A solution contains  $\text{Fe}^{2+}$ ,  $\text{Cu}^{2+}$ ,  $\text{Ni}^{2+}$  and  $\text{As}^{3+}$ . It is maintained saturated with  $\text{H}_2\text{S}$ . Then  
(A)  $\text{CuS}$  and  $\text{As}_2\text{S}_3$  precipitate (B)  $\text{NiS}$  and  $\text{FeS}$  precipitate  
(C)  $\text{NiS}$  precipitates (D) the solution becomes strongly acidic
45. A mixture of  $\text{Mn}(\text{OH})_2$  and  $\text{Cr}(\text{OH})_3$  can be separated by adding excess  
(A)  $\text{NaOH}$  (B)  $\text{NH}_4\text{Cl}$  (C)  $\text{NaHS}$  (D)  $\text{H}_2\text{O}_2$  followed by oxalic acid
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**Exactly three correct answers (Q 46-50)**

46. Addition of strongly alkaline  $\text{H}_2\text{O}_2$  will result in change in colour in which of the following accompanied by dissolution of precipitate.  
(A)  $\text{MnO}_2$  (B)  $\text{Bi}(\text{OH})_3$  (C)  $\text{KSCN}$  (D)  $\text{PbS}$
47. Addition of dil.  $\text{HCl}$  would turn the solution (colourless) white if the solution contains  
(A)  $\text{AgCl}$  (B)  $\text{AgNO}_3$  (C)  $\text{Na}_2\text{S}_2\text{O}_3$  (D)  $\text{Na}_2\text{S}_4\text{O}_6$
48. A transient violet colouration may be obtained by mixing  
(A)  $\text{Na}_2\text{S}$ ,  $\text{Na}_2\text{SO}_3$  and  $\text{Fe}^{3+}$  (acidified) (B)  $\text{Na}_2\text{S}$ ,  $\text{Na}_2\text{SO}_3$  and  $\text{Fe}^{3+}$  (neutral)  
(C)  $\text{KI}$  and  $\text{F}_2$  (D)  $\text{Na}_2\text{S}_2\text{O}_3$ ,  $(\text{NH}_4)_2\text{MoO}_4$  and conc.  $\text{H}_2\text{SO}_4$
49. A solution 'A' when added to B produces a white precipitate, soluble in excess of (A). (A) produces pink colour with phenolphthalein. A and B could be  
(A) aq.  $\text{NH}_3$  and  $\text{ZnSO}_4$  (B) aq.  $\text{NaOH}$  and  $\text{ZnSO}_4$   
(C) aq.  $\text{NH}_3$  and  $\text{Bi}(\text{NO}_3)_3$  (D) aq.  $\text{NaOH}$  and  $\text{Pb}(\text{NO}_3)_2$
50. The red colour of  $\text{Fe}(\text{SCN})_3$  is discharged by addition of  
(A)  $\text{NaF}$  (B)  $\text{Zn}$  rod (C)  $\text{Cu}$  rod (D)  $\text{Hg}^{2+}$
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**Chemistry Answer Key 04.03.06**

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