TOPIC : D – BLOCK ELEMENTS

1. Identify the species with an atom in +6 oxidation state :–

   (A) MnO_4^- (B) $Cr(CN)_6^{-3}$ (C) NiF_6^{-2} (D) CrO_2Cl_2

2. Which of the following set of metallic ions has equal magnetic moment?

   (A) Fe^+, Ni^{+2}, CO^{+3} (B) Fe^{+3}, CO^{+3}, Ni^{+3}

   (C) Fe^{+2}, CO^{+3}, Mn^{+3} (D) Fe^{+3}, CO^{+3}, Mn^{+3}

3. Which of the following species will impart colour to an aqueous solution :–

   (A) Cu^+ (B) Zn^{+2} (C) Cr^{+3} (D) Ti^4

4. In alkaline solution changes to

   (A) MnF_4^{-2} (B) MnO_2 (C) Mn_2O_3 (D) MnO

5. Which of the following compound is expected to be coloured :–

   (A) Ag_2SO_4 (B) CuF_2 (C) MgF_2 (D) CuCl

6. Transition elements form complexes very readily because of :–

   (A) Small cation size (B) Vacant d-orbitals

   (C) Large ionic charge (D) All are correct

7. $CrO_7^{-2} \xrightarrow{pH = A} CrO_4^{-2} \xrightarrow{pH = B} CrO_7^{-2}$ pH values A and B can be :–

   (A) 4 and 5 (B) 4 and 8 (C) 8 and 4 (D) 8 and 9

8. $HgCl_2$ and $SnCl_2$ can not co-exist in a solution due to :–

   (A) Common ion effect (B) Solubility product

   (C) Redox change (D) All

9. The fraction of chlorine precipitated by $AgNO_3$ solution form $[Co(NH_3)_5Cl]Cl_2$ is

   (A) 1/2 (B) 2/3 (C) 1/3 (D) 1/4

10. Oxygen is absorbed by molten Ag, which is evolved on cooling and the silver particles are scattered, the phenomenon is known as :–

    (A) Silvering of mirror (B) Spitting of silver

    (C) Frosting of silver (D) Hairing of silver

11. Which of the following has largest size :–

    (A) Zn^{+2} (B) Sc^{+4} (C) V^{+3} (D) Sc^{+2}

12. The most stable ion is :–

    (A) Mn^{+2} (B) Sc^{+4} (C) Fe^{+2} (D) Mn^{+3}

13. The effective atomic number of Cr (Z = 24) in $[Cr(NH_3)_6]Cl_3$ is

    (A) 35 (B) 27 (C) 33 (D) 36

14. Which of the following ions has minimum ionic radius :–

    (A) Ni^{+2} (B) Co^{+2} (C) Cr^{+2} (D) V^{+2}

15. In 3d-series, the Ionisation energy is minimum ionic radius :–

    (A) Zn (B) Ni (C) Sc (D) V

16. Which of the following statements are correct :–

    (A) $[Sc(H_2O)_6]^{+3}$, $[Ti(H_2O)_6]^{+4}$ are coloured complexes

    (B) Ions of d-block elements are coloured due to d-d transition

    (C) Ions of f-block elements are coloured due to f-f transition

    (D) Cu^+ is coloured ion

17. Fe is made passive by

(A) dil. H_2SO_4 (B) dil. HCl (C) aqua regia (D) conc. H_2SO_4

18. The central ion in $[Cu(H_2O)_4]^{+2}$ ion is :–

(A) Cu^{+2} (B) O^+ (C) H^+ (D) None

19. $CuSO_4$ solution reacts with KCN to form a complex :–

(A) $Cu(CN)_2$ (B) Cu(CN) (C) $K_2[Cu(CN)_4]$ (D) $K_3[Cu(CN)_4]$

20. Anhydrous $CuCl_2$ and $CuBr_2$ exist as :–

(A) Mnonomer (B) Dimer (C) Trimer (D) Polymer

21. When H_2O_2 is added to an acidified solution of $K_2Cr_2O_{78}$

(A) Solution turns green due to formation of Cr_2O_3

(B) A deep blue-violet coloured compound $CrO(O_2)_2$ is formed

(C) Solution gives green ppt. of $Cr(OH)_3$

(D) Solution turns yellow due to formation of K_2CrO_4

22. In $Na_2[Fe(CN)_5NO]$. Sodium nitroprusside :–

(A) Oxidation state of Fe is +2 (B) This has NO^+ as ligand

(C) Both are correct (D) None is correct

23. Out of $AgNO_3$, AgF and $AgClO_4$. Water insoluble salt is :–

(A) $AgNO_3$ (B) AgF (C) $AgClO_4$ (D) None

24. Arrange FeO, Fe_3O_4 and Fe_2O_3 in order of decreasing basic nature :–

(A) $FeO > Fe_3O_4 > Fe_2O_3$ (B) $Fe_3O_4 > FeO > Fe_2O_3$

(C) $Fe_3O_4 > Fe_2O_3 > Fe_3O_4$ (D) $Fe_2O_3 > FeO > Fe_3O_4$

25. d-block elements show variable oxidation state because the difference in energy between

(A) ns and nd orbitals is very light (B) ns and (n – 1) d orbitals is very slight

(C) ns and np orbitals is large (D) np and (n – 1) d orbitals is small

26. the transition metals have less tendency to form ion due to :–

(A) High I.E. (B) Low heat of hydration of ion

(C) High heat of sublimation (D) All of these

27. Which of the following is most basic hydroxide :–

(A) $Ce(OH)_3$ (B) $Lu(OH)_3$ (C) $Nd(OH)_3$ (D) $Gd(OH)_3$

28. Which of the following oxides of Mo is not known:–

(A) MoO_3 (B) Mo_2O_5 (C) MoO_2 (D) Mo_2O_7

29. The acid anhydride of permaganic acid is :–

(A) Mn_2O_7 (B) MnO_3 (C) MnO_2 (D) MnO

30. The one which is widely used as a protic solvent is:–

(A) Liq. SO_3 (B) Liq. SO_2 (C) HF (D) H_2SO_4

31. Which formula is suitable in calculating magnetic μ if unpaired electrons 'n' is known :–

(A) $\frac{\mu^2}{n} - 2 = n$ (B) $\frac{\mu}{n} - 2 = n$ (C) $\frac{\mu^2}{n^2} - 2 = n$ (D) $\frac{\mu^2}{n} - 1 = n$

32. In which of the following complexes chromium is present as a part of cation :–

(A) $K_3[CrF_6]$ (B) $[Cr(H_2O)_4Cl_2]Cl$

(C) $K_3Cr(C_2O_4)_3$ (D) $Cr(CO)_6$

33. Which of the following compound is paramagnetic and coloured also :–

(A) $K_2Cr_2O_7$ (B) $(NH_4)_2(TiCl)_6$

(C) $VOSO_4$ (D) $K_3[Cu(CN)_4]$

34. Auric chloride on reaction with Ferrous sulphate changes to :–

(A) Au (B) AuCl (C) Au_2SO_4 (D) $Au_3(SO_4)_2$

35. Silver nitrate produces a black stain on skin due to :–

(A) Its corrosive action (B) Its reduction on metallic silver

(C) Its strong reducing action (D) The formation of a complex compound

36. Maximum conductivity would be observed in the solution of :–

(A) $[CO(NH_3)_6]Cl_3$ (B) $[CO(NH_3)_5Cl]Cl_2$

(C) $[CO(NH_3)_4Cl_2]Cl$ (D) $[CO(NH_3)_3Cl_2]$

37. $K_3[CrF_6]$ is a :–

(A) Complex salt (B) Double salt (C) Normal saltl (D) Basic salt

38. For which one of the following ions, the colour is not due to a d-d transition :–

(A) CrO_4^{-2} (B) $Cu(NH_3)_4^{+2}$ (C) $Ti(H_2O)_6^{+3}$ (D) CoF_6^{-3}

39. Cu_2Cl_2 is obtained from $CuCl_2$:–

(A) By heating cupric chloride with conc. HCl and copper turnings

(B) By passing H_2 over $CuCl_2$

(C) By heating cupric chloride with chlorine

(D) All

40. Which of the following statement is correct :–

(A) The chromate ion, is a common anion in neutral or alkaline solution

(B) In acidic solution ion dimerises to form chromate ion,

(C) Dichromate ion is a very strong oxidising agent and reduces to Cr^3 ion

(D) All

41. Which of the following statement is correct :–

(A) Chromium metal is used as a protective coating for steel to increase its resistance to corrosion

(B) $Cr(OH)_2$ is basic in nature but $Cr(OH)_3$ is amphoteric

(C) Cr^2 is a good reducing agent and is usually oxidised to Cr^{+3} ion

(D) All

42. Iodide of Million's base is :–

(A) $K_2[HgI_4]$ (B) $(NH_2)HgOHgI$

(C) $[Hg_2O.NH_2OH].H_2O$ (D) $Hg(NH_2)I + Hg$

43. Mond process is used in the extraction of :–

(A) CO (B) Ni (C) Mo (D) Zn

44. Match List I with List II and select the correct answer using the codes given below the lists :–

List-I	**List-II**
Metals	**Ore's**
I. Zinc	1. Azurite
II. Tin	2. Carnallite
III. Copper	3. Calamine
IV. Magnesium	4. Cassiterite

	I	II	III	IV
(A)	3	4	2	1
(B)	4	1	3	2
(C)	3	4	1	2
(D)	4	3	2	1

45. In the manufacturing of ion from an iron ore, lime stone is added because it acts as :–

(A) An oxidising agent (B) A reducing agent

(C) A flux (D) A precipitating agent

46. Identify the correct statement when $CuSO_4$ (aq.) is mixed with KI :–

(A) Cu^{+2} is reduced and I^- is oxidised

(B) The solution becomes brown to literated I_2

(C) Cu_2I_2 formed is white

(D) All

47. When KCN is added to $CuSO_4$ solution :–

(A) KCN acts as reducing agent (B) KCN acts as complexing agent

(C) $K_3[Cu(CN)_4]$ is formed (D) All correct

48. Zinc reacts with very dilute nitric acid to produce:–

(A) NO (B) NH_4NO_3 (C) NO_2 (D) H_2

49. A metal gives two chlorides 'x' and 'y'. 'x' gives black precipitate with NH_4OH and 'y' gives white with KI 'y' gives a red precipitate soluble in excess of KI. 'x' and 'y' are respectively :–

(A) $HgCl_2$ and Hg_2Cl_2 (B) Hg_2Cl_2 and $HgCl_2$

(C) $HgCl_2$ and $ZnCl_2$ (D) $ZnCl_2$ and $HgCl_2$

50. From an aqueous solution zinc sulphate normal zinc carbonate may be precipitated by :–

(A) Passing CO_2 (B) Warming with $NaHCO_3$

(C) Adding Na_2CO_3 (D) Boiling with $CaCO_3$

ANSWERS KEY

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