

Special test Inorganic Chemistry

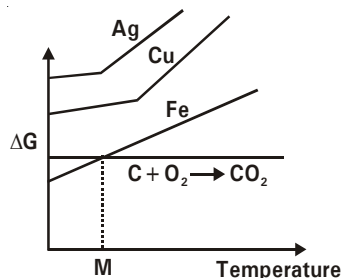
MM : 200

Time : 1 hrs.

Topic : s-block, p-block, Hydrogen, d & f block, Coordination compounds & Extraction

- Among CaH_2 , NH_3 , NaH and B_2H_6 , which are covalent hydrides?
(1) NH_3 and B_2H_6
(2) NaH and CaH_2
(3) NaH and NH_3
(4) CaH_2 and B_2H_6
- I_2 dissolves appreciably in aq. solution of KI forming
(1) I_3^+ ions
(2) I^+ ions
(3) I_3^- ions
(4) I^{3-} ions
- Which is the correct order of ionic mobility of alkali metal cations in an aqueous solvent?
(1) $\text{Li}^+ < \text{Na}^+ < \text{K}^+ < \text{Rb}^+ < \text{Cs}^+$
(2) $\text{Na}^+ < \text{K}^+ < \text{Rb}^+ < \text{Cs}^+ < \text{Li}^+$
(3) $\text{Cs}^+ < \text{Rb}^+ < \text{K}^+ < \text{Na}^+ < \text{Li}^+$
(4) $\text{Li}^+ < \text{Cs}^+ < \text{Rb}^+ < \text{K}^+ < \text{Na}^+$
- The number of σ bonds in P_4O_{10} is
(1) 6
(2) 16
(3) 20
(4) 7
- Aluminium chloride exists as a dimer, Al_2Cl_6 , in solid state as well as in solution of nonpolar solvents such as benzene. When dissolved in water, it gives
(1) $\text{Al}^{3+} + 3\text{Cl}^-$
(2) $[\text{Al}(\text{Cl})_6]^{3-} + 3\text{HCl}$
(3) $[\text{Al}(\text{H}_2\text{O})_6]^{3+} + 3\text{Cl}^-$
(4) $\text{Al}_2\text{O}_3 + 6\text{HCl}$
- Assertion** : On combustion in excess of air, lithium forms mainly the oxide, sodium forms the peroxide, mainly while K , Rb , Cs form the superoxides.
Reason : The increasing stability of the peroxide or superoxide, as the size of the metal ion increases, is due to the stabilisation of large anions by larger cations through lattice energy effect.
(1) Both Assertion and Reason are true and the reason is the correct explanation of the assertion
(2) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion
(3) Assertion is true statement but Reason is false
(4) Assertion is false
- $\text{SiCl}_4 \xrightarrow{\text{H}_2\text{O}} \text{A} \xrightarrow{\text{Heat}} \text{B} \xrightarrow[\text{fuse}]{\text{NaOH}} \text{C}$.
The compound 'C' is
(1) Si
(2) SiO_2
(3) SiC
(4) Na_2SiO_3
- At a site, low grade copper ores are available; and zinc and iron scraps are also available. The suitable/ advisable scrap(s) for reducing the leached copper ore is/are
(1) zinc and iron both
(2) zinc
(3) iron
(4) neither zinc nor iron
- The dissociation of dihydrogen into its atoms is only $\sim 0.081\%$ around _____ which increases to 95.5% at _____.
(1) 200 K, 500 K
(2) 1000 K, 5000 K
(3) 2000 K, 5000 K
(4) 2000 K, 3000 K
- Which pair represents halogen acid with longest bond length and the one with highest bond energy respectively?
(1) HI , HBr
(2) HCl , HF
(3) HI , HF
(4) HBr , HCl
- Which of the following can be kept only in the atmosphere of CO_2 ?
(1) BeCO_3
(2) CaCO_3
(3) BaCO_3
(4) SrCO_3
- Low spin complex of d^6 cation in an octahedral field will have the following energy
(P = pairing energy)
(1) $-\frac{12}{5} \Delta_0 + P$
(2) $-\frac{12}{5} \Delta_0 + 3P$
(3) $-\frac{2}{5} \Delta_0 + 2P$
(4) $-\frac{2}{5} \Delta_0 + P$

13. The number of S-S bonds in S_3O_9 is
 (1) Three
 (2) Two
 (3) One
 (4) Zero
14. **Statement- I** : Tritium is radioactive isotope of hydrogen and it emits β -particles
Statement- II : Terrestrial hydrogen contains deuterium mostly in the form of HD.
 (1) Both statement -I and statement- II are correct
 (2) Both statement-I and statement-II are incorrect
 (3) Statement-I is correct but statement-II is incorrect
 (4) Statement-I is incorrect but statement- II is correct
15. Which of the following nitrates on heating decomposes to give NO_2 gas?
 (1) $NaNO_3$ or KNO_3
 (2) $LiNO_3$ or KNO_3
 (3) $LiNO_3$ or $Mg(NO_3)_2$
 (4) $NaNO_3$ or $MgNO_3$
16. Consider following diagram and choose the INCORRECT statements



- (1) Above point M, Ag can reduce the oxide of Fe.
 (2) Fe and C do not show any phase transition.
 (3) At high temperature C is the best reducing agent for the oxides of Ag, Cu, Fe.
 (4) Below point M, Cu can reduce the oxide of Ag.
17. What is not true for tetrahedral crystal field?
 (1) The d orbital splitting is inverted and is smaller as compared to the octahedral field splitting
 (2) The orbital splitting energies are sufficiently large for forcing pairing and, therefore, low spin configurations are commonly observed.
 (3) 'g' subscript is not used with energy levels
 (4) Both 2 and 3

18. How many statements are correct?
 a. Nitrogen in the earth's crust occurs in Chile saltpetre and Indian saltpetre.
 b. Nitrogen is found in the form of proteins in plants and animals.
 c. Both nitrogen and phosphorus occur in minerals of the apatite family.
 d. Phosphorus is present in bones as well as in living cells.
 (1) Two
 (2) Three
 (3) One
 (4) Four
19. The high reactivity and high volatility of white phosphorus is due to
 (1) tetrahedrally linked P_4 chains
 (2) bond angle of 60°
 (3) weak van der Waals forces of attraction
 (4) Both 2 and 3
20. Which of the following is a high-spin (spin-free) complex?
 (1) $[Co(NH_3)_6]^{3+}$
 (2) $[Fe(CN)_6]^{4-}$
 (3) $[CoF_6]^{3-}$
 (4) $[Zn(NH_3)_6]^{2+}$
21. In $Na_2[B_4O_5(OH)_2] \cdot 8H_2O$, sum of number of B-O-B bonds and number of sp^2 hybridised B-atoms is
 (1) 7
 (2) 10
 (3) 14
 (4) 20
22. Which of the following is/are characteristic features of C_{60} fullerene?
 (1) It can be obtained by heating diamond in the presence of inert gas
 (2) It appears like a ball which consists of pentagons only
 (3) It can be obtained from chimney soot
 (4) All are correct
23. Which of the following is INCORRECT?
 (1) $Lu(OH_3)$ is a weaker base than $La(OH)_3$
 (2) Zr^{4+} and Hf^{4+} possess almost same ionic radii
 (3) Ce^{4+} can act as oxidising agent
 (4) Eu^{2+} and Yb^{2+} are good oxidising agents.
24. Dihydrogen forms two different compounds with oxygen. One of the compound 'A' is most stable while the other compound 'B' is highly unstable and slowly decompose to form 'A' along with a colourless gas 'C'. Identify A, B and C respectively
 (1) H_2O_2 , O_2 , HO_2
 (2) H_2O_2 , H_2O , H_3O_2
 (3) H_2O , H_2O_2 , O_2
 (4) O_2 , H_2O , H_2O_2

25. The catenation tendency is weaker in nitrogen than in phosphorus due to
- (1) weaker $\text{N} \equiv \text{N}$ bond than $\text{P}-\text{P}$ bond
 - (2) weaker $\text{N}-\text{N}$ bond than $\text{P}-\text{P}$ bond
 - (3) tendency of N to form $p(\pi)-p(\pi)$ bonds
 - (4) absence of $p(\pi)-p(\pi)$ bonds in P
26. The correct order of enthalpy of vapourisation of noble gases is
- (1) $\text{Xe} > \text{Kr} > \text{Ar} > \text{Ne} > \text{He}$
 - (2) $\text{Xe} < \text{Kr} < \text{Ar} < \text{Ne} < \text{He}$
 - (3) $\text{Xe} > \text{Ar} > \text{Kr} > \text{Ne} > \text{He}$
 - (4) $\text{Kr} > \text{Ar} > \text{Ne} > \text{Xe} > \text{He}$
27. Match the coordination compounds given in Column I with the central metal atoms given in Column II and assign the correct code :
- | Column I | Column II |
|----------------------------|--------------|
| a. Chlorophyll | i. rhodium |
| b. Blood pigment | ii. cobalt |
| c. Wilkinson catalyst | iii. calcium |
| d. Vitamin B_{12} | iv. iron |
| | v. magnesium |
- (1) a-v, b-iv, c-i, d-ii
 - (2) a-iii, b-iv, c-v, d-i
 - (3) a-iv, b-iii, c-ii, d-i
 - (4) a-iii, b-iv, c-i, d-ii
28. Which of the following will not be coloured in aqueous solution?
- (1) Co^{2+}
 - (2) Sc^{+3}
 - (3) Mn^{+2}
 - (4) V^{3+}
29. Calgon is an industrial name given to
- (1) normal sodium phosphate
 - (2) sodium meta-aluminate
 - (3) sodium hexametaphosphate
 - (4) hydrated sodium aluminium silicate
30. Which one series of the following has almost same size?
- (1) $\text{Na}, \text{K}, \text{Mg}, \text{Ca}$
 - (2) $\text{Fe}, \text{Co}, \text{Ni}, \text{Cu}$
 - (3) $\text{Be}, \text{Al}, \text{Mg}, \text{Ca}$
 - (4) $\text{F}, \text{Cl}, \text{Br}, \text{I}$
31. A complex of cobalt has 5 ammonia molecules, 1 nitro group and 2 chlorine atoms for each cobalt atom. 1 mole of this compound produces 3 mole ions in aqueous solution which on treating with excess of AgNO_3 gives 2 moles of AgCl . The formula of compound is
- (1) $[\text{Co}(\text{NH}_3)_4\text{NO}_2\text{Cl}] [(\text{NH}_3)\text{Cl}]$
 - (2) $[\text{Co}(\text{NH}_3)_5\text{Cl}] [\text{NO}_2\text{Cl}]$
 - (3) $[\text{Co}(\text{NH}_3)_5\text{NO}_2]\text{Cl}_2$
 - (4) $[\text{Co}(\text{NH}_3)_5] [(\text{NO}_2)_2\text{Cl}_2]$
32. Which of the following statement regarding limitation of valence bond theory in coordination compounds is correct.
- (1) It gives quantitative interpretation of magnetic data
 - (2) It gives quantitative interpretation of thermodynamic stability
 - (3) It can distinguish between weak and strong ligands
 - (4) It does not give exact predictions regarding the tetrahedral and square planar structure of four coordinate complexes
33. XeF_4 reacts violently with water to give
- (1) $\text{Xe} + \text{O}_2$
 - (2) $\text{XeO}_3 + \text{O}_2 + \text{HF}$
 - (3) $\text{Xe} + \text{O}_2 + \text{HF} + \text{XeO}_3$
 - (4) XeOF_3
34. Select the correct statement(s)
- (1) CO_2 and SiO_2 are acidic, SnO_2 is amphoteric
 - (2) monohalides of Ga & In shows disproportionation
 - (3) PbO_2 is an oxidising agent
 - (4) all of these
35. Unknown species is
- (1) $[\text{SiCl}_6]^{2-}$
 - (2) $[\text{AlF}_6]^{3-}$
 - (3) $[\text{B}(\text{H}_2\text{O})_6]^{3+}$
 - (4) both (1) and (3)
36. The complex $[\text{Zn}(\text{NH}_3)_4]^{2+}$ is
- (1) tetrahedral
 - (2) square planar
 - (3) triangular bipyramid
 - (4) octahedral
37. Two sulphide ores are separated by froth floatation method by addition of
- (1) depressants
 - (2) inhibitors
 - (3) coagulants
 - (4) precipitators
38. **Statement- I** : When borax is heated in a Bunsen burner flame with CoO on a loop of platinum wire, a blue coloured $\text{Co}(\text{BO}_2)_3$ bead is formed.
- Statement- II** : The metaborates of many transition metals have characteristic colours and, therefore, borax bead test can be used to identify them in the laboratory
- (1) Both statement -I and statement-II are correct
 - (2) Both statement-I and statement-II are incorrect
 - (3) Statement-I is correct but statement-II is incorrect
 - (4) Statement-I is incorrect but statement- II is correct

39. Identify the incorrect statement
- Aluminium can reduce, MgO above 1623K
 - ZnO can be reduced with CO at a high temperature
 - Carbon can reduce even the stable oxides at a high temperature when it gets converted to CO
 - Mg is mostly used to reduce Al_2O_3 below 1623 K
- only b
 - b and d
 - only d
 - a, b, c and d
40. Amongst the following, maximum π back donation will be in
- $[\text{Mn}(\text{CO})_6]^+$
 - $[\text{Cr}(\text{CO})_6]$
 - $[\text{V}(\text{CO})_6]^-$
 - $[\text{Fe}(\text{CO})_5]$
41. Between which two elements, significant increase in the density is noted in the first transition series
- From titanium to copper
 - From titanium to zinc
 - From copper to titanium
 - From scandium to zinc
42. **Assertion** : The magnetic moment of $[\text{Mn}(\text{CN})_6]^{-3}$ is zero.
Reason : Cyanide ion is a strong field ligand and so induces pairing in the above complex.
- Both Assertion and Reason are true and the reason is the correct explanation of the assertion
 - Both Assertion and Reason are true but the reason is not the correct explanation of the assertion
 - Assertion is true statement but Reason is false
 - Assertion is false
43. 20 mL of a sample of H_2O_2 gives 400 mL of oxygen measured at NTP. The sample should be labelled as
- 5 vol. H_2O_2
 - dil. H_2O_2
 - anhydrous H_2O_2
 - 20 vol. H_2O_2
44. $\text{X} + \text{C} + \text{Cl}_2 \xrightarrow[\text{temp.}]{\text{high}} \text{Y} + \text{CO}$
 $\text{Y} + 2\text{H}_2\text{O} \rightarrow \text{Z} + 2\text{HCl}$
 Compound x, y has a polymeric structure
 Compound x, y and z are
- BeCl_2 , BeO , Be_2C
 - BeO , BeCl_2 , $\text{Be}(\text{OH})_2$
 - $\text{Be}(\text{OH})_2$, BeC , BeCl_2
 - BeO , $\text{Be}(\text{OH})_2$, BeCl_2
45. Malachite is
- $\text{CaCO}_3 \cdot \text{Ca}(\text{OH})_2$
 - Cu_2O
 - $\text{CuCO}_3 \cdot \text{Cu}(\text{OH})_2$
 - $\text{CaCO}_3 \cdot \text{MgCO}_3$
46. Which statement is incorrect about B_2H_6 ?
- It is prepared by reaction of BF_3 with LiAlH_4 in ether
 - B_2H_6 catches fire spontaneously on exposure to air
 - In B_2H_6 , $\text{H}_t\text{-B-H}_t$ angle is greater than $\text{H}_b\text{-B-H}_b$ angle
 - Reaction with NH_3 initially gives $\text{B}_2\text{H}_6 \cdot 3\text{NH}_3$ which is formulated as $[\text{BH}_2(\text{NH}_3)_2]^+ [\text{BH}_4]^-$
47. Which of the following is acidic?
- Mn_2O_7
 - VO
 - MnO_2
 - NiO
48. Which of the following halides hydrolyses easily?
- BF_3
 - SiCl_4
 - CCl_4
 - NF_3
49. Which f-block element(s) show(s) + 7 oxidation state?
- Th
 - Np
 - U
 - All of these
50. Which of the following statements is false ?
- Copper on reaction with dil HNO_3 evolve NO
 - Brown colour complex formed in ring test of nitrate has Fe in + 1 state
 - In all oxyacids of chlorine, chlorine is in sp^3 hybridization state
 - When ozone reacts with excess of potassium iodide in carbonate buffer, iodine is liberated