MOST IMPORTANT 3 MARKS QUESTIONS FROM VOLUME - I

CHAPTER -1 ATOMIC STRUCTURE - II

1. What do you understand by dual character of matter?
2. State Heisenberg's Uncertainty Principle.
3. Distinguish between a particle and a wave.
4. What are molecular orbital?
5. What are the conditions for effective H_2-bonding?
6. Why is He_2 not formed? (or) Draw the molecular orbital diagram of Helium molecule.
7. What is bond order?
8. What is the significance of negative electronic energy?
9. Define Hybridisation.
10. Give the applications of de Broglie concept.
11. Give any three methods of verifying the particle character of matter.
12. Give the significance of de Broglie concept .
13. Write about the shape of 's' orbital.
14. Write about the shape of 'p' orbital.
15. Write about the shape of 'd' orbital.
16. Draw the molecular orbital diagram of Hydrogen molecule.
17. Predict the hybridization of (a) BCl_3 (b) NH_4^{+1} (c) CO_3^{-2} [Any one]
18. What is hydrogen bonding?
19. Give the three importance of hydrogen bonding.
20. Calculate the momentum of a particle which has a de-Broglie wavelength of 1 Å

CHAPTER -2 PERIODIC PROPERTIES - II

21. Why is electron affinity of fluorine less than that of chlorine? (B)(M6,8,13,S7,S9,10)
22. Why is the first ionisation energy of **Be**ryllium greater than that of **Li**thium? (J6,11)
23. Explain why the first ionisation energy of '**Be**' is greater than that of '**B**'. (S6)
24. Compare the ionisation energy of **N**itrogen with that of **O**xygen? (M7)
25. Compare the ionisation energy of **B**oron and **C**arbon. (J12)
26. The Ionisation energy of **N**itrogen is greater than that of **C**arbon. Give reason.
27. The Ionisation energy of **Ne**on is greater than that of **F**luorine.Give reason. (S9,J10)
28. Mention the Disadvantage of Pauling's and Mullikan's electronegativity scale. (B)(S8)
29. Why is the ionization energy of **F**luorine greater that of **O**xygen? (M9)
30. The electron affinities of Beryllium and Nitrogen are almost zero.Why? (M10)
31. The electron affinities of noble gases are zero.Why?
32. The electron affinities of group 17 elements are high.Why?
33. Calculate the electronegativity of fluorine by Mulliken scale. The ionization energy of fluorine is 17 eV/atom. The electron affinity of fluorine is 3.62 eV/atom. (M11)
34. If the d(C-Cℓ) is 1.76 Å and r (Cℓ) is 0.99 Å., Find the radius of carbon atom? (B)(J7)

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35. Calculate the effective nuclear charge experienced by the 4s electron in potassium atom. (S=16.8) (S7,12)
36. Define electron affinity. (M8)
37. Define electronegativity.

CHAPTER -3 p BLOCK ELEMENTS

38. What is inert pair effect? (M9)
39. What is plumbo solvency? (B) (J6,7,9,S6,M10,13)
40. What is the action of lead with con. HCl?
41. How is potash alum prepared? (M8)
42. Mention the uses of potash alum. (J12)
43. How is phosphoric acid prepared in the laboratory? (J8)
44. H_3PO_4 is triprotic. Prove. (M6,13)
45. Prove that phosphorous acid is a powerful reducing agent. (J6, M7)
46. How is phosphine prepared in the laboratory?
47. Prove that phosphine is a powerful reducing agent.
48. Illustrate the dehydration property of phosphorous pentoxide (P_2O_5) with two examples. (B) (M7,9,J10,S6,12)
49. What happens when phosphorus acid of heated? (J9)
50. H_3PO_3 is diprotic. Why? (S9,M10)
51. What is the action of heat on orthophosphoric acid? (M11)
52. Give the electronic structure of (i) H_3PO_4 (ii) $PC\ell_3$ (iii) $H_4P_2O_7$
53. Give the electronic structure of (i) H_3PO_3 and (ii) $PC\ell_5$. (S8,J11)
54. Give one test for orthophosphoric acid.
55. Give the uses of orthophosphoric acid.
56. Write about the Holme's signal (S7,9)
57. What is etching of glass?
58. How is HF prepared?
59. Write the preparation of ClF, ClF_3 and IF_7. (J12)
60. Write three uses of fluorine. (S12)
61. Why is HF not stored in silica or glass bottles? Write the equation. (M7,11)
62. Illustrate the oxidising power of fluorine. (B)(J7)
63. What are interhalogen compounds? Give the preparation of any one. (B) (S8)
64. Interhalogen compounds are more reactive than halogens. Why?
65. Give three uses of Neon. (B) (J8,10,S10)
66. Write any three uses of Helium. (S7)
67. Give the uses of argon, krypton and xenon.

CHAPTER - 4 d BLOCK ELEMENTS

68. What are "d" block elements?
69. How are "d" block elements classified?

70. Why does Mn(II) show maximum paramagnetic character among the bivalent ions of the first transition series?
71. Explain why Mn^{2+} is more stable than Mn^{3+}. (B) (M6,J12)
72. A substance is found to have a magnetic moment of 3.9 BM. How many unpaired electrons does it contain? (B) (M6)
73. Find the magnetic moment of Fe^{+2} ion.
74. Zn, Cd, Hg do not form colourless compounds. Why?
75. Sc^{+3} and Zn^{+2} ions are colourless. Why?
76. Why do transition elements form complexes? (B) (J6,S7)
77. Why do d – block elements have variable oxidation state? (B) (S6,J7,M13)
78. Why are Zn^{2+} salts colourless while Ni^{2+} salts are coloured? (B)(J9,S12)
79. Why are transition metal ions coloured? (S9)
80. Most of the transition metals and their compounds have catalytic activity. Why?
81. Why do transition metals form alloys?
82. How is chrome – plating done? (S6,M8)
83. Write two alloys of copper and their uses.
84. Explain electrolytic refining of copper. (J7)
85. What is spitting of silver and how is it prevented? (S7,M13)
86. What is Philosopher's wool? How is it prepared?
87. What is the action of Zinc on hot NaOH solution? (S8)
88. Give any two evidences for the oxidising nature of potassium dichromate. (J6)
89. What happens when $K_2Cr_2O_7$ is heated?
90. Explain Chromyl chloride test with equation. (M9)
91. What is blue vitriol and how is it prepared?
92. What is the action of heat on copper sulphate crystals? Write the equation.
93. What is the reaction of $CuSO_4$ with NaOH and ammonia?
94. What is the reaction of $CuSO_4$ with KCN?
95. What happens when KI solution is added to an aqueous solution of copper sulphate? (S9)
96. What is the reaction of $CuSO_4$ with H_2S?
97. How is Lunar caustic prepared? (S12)
98. What happens when $AgNO_3$ is heated?
99. What is aqua regia? Write the action of aqua regia on gold. (M7)
100. What is calamine and how is it prepared?
101. What is purple of cassius and how is it prepared?

CHAPTER – 8 SOLID STATE - II

102. Define Unit cell.
103. What are superconductors? Give any one of its applications.(B,M6,10,13J6,8,S6)
104. What is a Vitreous state? (B) (S6,S7)
105. How are crystals classified?
106. What is imperfection in solids?

107. What is coordination number?
108. Write a note on the assignment of atoms per unit cell in FCC.
109. Write a short note on Metallic crystals.
110. Write a note on ionic crystals.
111. Give any three properties of ionic crystals.
112. Write a note on covalent crystals.
113. Determine the no.of CsCℓ units per unit cell. CsCℓ has BCC arrangement.(B) (M7
114. What is meant by superconducting transition temperature? (J7)
115. Write a note on Molecular crystals. (M8)
116. Write a note on Frenkel defect. (J8)
117. Write a note on Schottky defect.
118. Sketch the following lattices : (B) (M9,J12)
(a) Simple cubic (b) Face – centred cubic (c) Body centred cubic
119. How are glasses formed? (B) (S9,12)
120. State the uses of super conductors. (B) (J10,S10)
121. State Bragg's law. (B) (J11)

CHAPTER – 9 THERMODYNAMICS - II

122. What is entropy? What is its unit? (B) (M6)
123. What is Gibbs' free energy? (B) (J6)
124. What types of liquids or substances deviate from Trouton's Rule? (S6,J11)
125. Give the Kelvin-Planck statement of second law of thermodynamics. (B)(M7,S12)
126. State Claucius statement of second law of thermodynamics. (B) (J7)
127. When does entropy increases?
128. Mention the essential condition for spontaneity in a chemical reaction.
129. What is the entropy change of an engine that operates at 100°C. When 453.6 k.cal of heat is supplied to it? (S7,9,J12)
130. Calculate the molar hear of vaporization of the ideal liquid $CC\ell_4$ (Boiling point of $CC\ell_4$ is 76.7°C and ΔS = 87.864 J) (M8)
131. ΔH and ΔS values of a reaction of 300K are -10Kcal mol^{-1} and 20 cal deg^{-1} mol^{-1} respectively. Calculate ΔG value. (J8,10)
132. Give entropy statement of second law of thermodynamics. Mention the unit of entropy also. (S8)
133. Calculate the entropy change involved in the conversion of 1 mole of ice at 0°C and 1 atm. The entropy of fusion per mole of ice is 6008 J mol^{-1}) (M9)
134. State Trouton's rule. (S9)
135. Give the limitations of Trouton's rule.
136. Calculate the change of entropy for the process water (liq) to water (Vapour, 373K) involving Δ_{Vap} = 40850 J mol^{-1} at 373 K (M10)
137. 1 mole Sn (α, 13^0C) $\rightleftharpoons$ 1 mole Sn (β, 13^0C) Calculate the entropy change for the following process possessing $\Delta H_{(transition)}$ = 2090 J mol^{-1}. (M13)
138. How is ΔG and ΔS? What is the meaning of ΔG=0? (B) (S10)

139. Calculate the maximum % efficiency possible from a thermal engine operating between 110°C and 25°C. (M11)

CHAPTER –10 CHEMICAL EQUILIBRIUM - II

140. The equilibrium constant K_c for $A(g) \rightleftharpoons B(g)$ is 2.5×10^{-2}. The rate constant of the forward reaction is 0.05 s^{-1}. Calculate the rate constant of the reverse reaction. (M6)

141. In the equilibrium $H_2 + I_2 \rightleftharpoons 2HI$, the number of moles of H_2, I_2 and HI are 1,2,3 moles respectively. Total pressure of the reaction mixture is 60 atm. Calculate the partial pressure of H_2 and HI in the mixture. (J6)

142. Write the equilibrium constants K_c for the following reactions (S6)

(i) $H_2O_{2(g)} \rightleftharpoons H_2O_{(g)} + \frac{1}{2} O_{2(g)}$ (ii) $CO_{(g)} + H_2O_{(g)} \rightleftharpoons CO_{2(g)} + H_{2(g)}$

143. State Le Chatelier's principle. (B)(M6,7,10,13)

144. What happens when $\Delta n_g = 0$, Δn_g = -ve, Δn_g = +ve in a gaseous reaction? (J7)

145. Define reaction quotient. (S7)

146. What is the relationship between formation equilibrium constant and dissociation constant? (M8)

147. What is the Reaction quotient? How is it related to equilibrium constant? (J8)

148. For the reaction $A+B \rightleftharpoons 3C$ at 25°C, a 3 litre volume reaction vessel contains 1,2 and 4 moles of A,B and C respectively at equilibrium. Calculate the equilibrium constant K_c of the reaction at 25°C. (S8)

149. Degree of dissociation of $PC\ell_5$ at 1 atm 25°C is 0.2. Calculate the pressure at which $PC\ell_5$ is half dissociated at 25°C. (S12)

150. Explain the effect of temperature and pressure on the following equilibrium by using Le Chatlier's principle.$N_2O_{4(g)} \rightleftharpoons 2NO_{2(g)}$ ΔH = + 59.0 kJ/mol (J12)

151. Dissociation of $PC\ell_5$ decreases in the presence of increase in $C\ell_2$ Why?(B) (M9,J11)

152. Dissociation equilibrium constant of HI is 2.06×10^{-2} at 458°C. At equilibrium concentration of HI and I_2 are 0.36M and 0.15M respectively. What is the equilibrium concentration of H_2 at 458°C? (J9)

153. What is equilibrium constant? (B) (S9)

154. Why is chemical equilibrium called as dynamic equilibrium? (B) (M11)