

INORGANIC CHEMISTRY

XII-Std Time Allowed: 3 Hours

[Maximum Marks: 150]

PART – I

Note: Answer all the Questions

Choose and Write the correct answer

(30x1=30)

1. de – Broglie relation is
a) $\lambda=h/p$. b) $\lambda=hpc$. c) $\lambda=h+p$. d) $\lambda=h-p$.
2. Molecular orbital with less energy is
a) σ_{1s} . b) σ^*_{1s} c) π_{2p_y} d) $\pi^*_{2p_y}$
3. The high boiling point of a compound may be due to
a) London forces. b) vander waals forces. c) inter molecular hydrogen bonding.
d) intra molecular hydrogen bonding.
4. The intra – molecular hydrogen bonding in molecules leads to
a) high boiling point b) less boiling point b) low solubility in water d) b and c
5. The effective nuclear charge is equal to
a) Z-S b) Z+S c. A-Z d) Z+A
6. The lowest ionisation potential in the periodic table is shown by
a) alkali metals b) halogens c) noble gases d) alkaline earth metals
7. As we go from left to right in a period, electron affinity value
a) decreases b) does not change c) increases d) varies irregularly
8. Which one of the following properties is used to determine the percentage of ionic character of the bond between the two atoms?
a) Electron affinity b) Electronegativity c) Ionisation potential d) atomic radius
9. The electronegativity of Cl according to Pauling's scale is
a) 2.1 b) 1.77 c) 3.87 d) -1.77
10. Which does not exhibit allotropy?
a) C b) Si c) Pb d) Sn
11. H_3PO_3 is
a) dibasic b) monobasic c) tribasic d) tetrabasic
12. Chemicals involved in Holme's signals are
a) CaC_2 and Ca_3P_2 b) CaC_2 and Ca_2P_3 c) Ca_2C and Ca_2P_3 d) Ca_2C and Ca_3P_2
13. The weakest acid among the following is
a) HF b) HBr c) HCl d) HI
14. Which is used for preventing dental cavities?
a) CaF_2 b) SF_6 c) UF_6 d) NaF
15. Which of the following metal ions are green in colour?
a) V^{3+} , Co^{2+} b) V^{3+} , Co^{2+} , Fe^{2+} c) V^{3+} , Fe^{2+} , Ni^{2+} d) V^{3+} , Ti^{3+} , Ni^{2+}
16. The number of unpaired electrons in Fe^{+3} ion is
a) 2 b) 3 c) 4 d) 5
17. The slag formed in the extraction of copper is
a) $FeSiO_3$ b) $CaSiO_3$ c) $CuSiO_3$ d) $MgSiO_3$
18. $Cu+Con2H_2SO_4 \rightarrow A+B+2H_2O$ A and B are respectively
a) $CuSO_4$ and SO_2 b) Cu_2S and SO_2 c) CuO and SO_3 d) $CuSO_4$ and SO_3
19. The anode used in chrome plating is
a) Pure Cr b) impure Cr c) Pb d) Hg
20. The ignition mixture used in alumino thermic process is
a) BaO_2+Mg powder b) BaO_2+Mg (ribbon) c) $BaO+Mg$ powder d) $BaO+Al$ (powder)
21. The metal used for galvanizing iron sheets is
a) Cr b) Cu c) Zn d) Ag
22. Ammoniacal silver nitrate is called
a) Tollen's reagent b) Baeyer's reagent c) Lucas reagent d) Nessler's reagent
23. The oxides of lanthanides used in gas lamp materials are
a) CeO_2 and NdO_2 b) CeO_2 and ThO_2 c) ThO_2 and SmO_2 d) LuO_2 and CeO_2
24. A cationic complex is
a) $[Co(NH_3)_6]Cl_3$ b) $Na[Ag(CN)_2]$ c) $Na_2 [Zn(CN)_4]$ d) $K[Au(CN)_2]$
25. IUPAC name of $[Co(NH_3)_6]Cl_3$
a) Cobalt ammonia chloride b) Cobalt hexa ammonia chloride
c) Cobalt (III) hexa ammonia chloride d) Hexa ammine cobalt (III) chloride
26. The colour of the pigment copper phthalocyanine is
a) red b) violet c) blue d) green

27. ${}_{92}\text{U}^{235} + {}_0^1\text{n} \rightarrow {}_{42}\text{Mo}^{98} + {}_{54}\text{Xe}^{136} + x {}_{-1}\text{e}^0 + 2{}_0^1\text{n}$ Then x is
 a) 1 b) 2 c) 3 d) 4
28. Isotope used in Brain scan is
 a) ${}_1\text{H}^3$ b) ${}_6\text{C}^{11}$ c) ${}_6\text{C}^{14}$ d) ${}_{80}\text{Hg}^{197}$
29. The half life period of a particular decay is 5 years The time taken for 75% of the decay is
 a) 5 years b) 10 years c) 8.75 years d) 6.67 years
30. The time taken for 10g of initial amount of a substance become 5g in a decay is 2 hours. The time taken for 1g initial amount to become 0.5g in the same decay is
 a) 2 hours b) 20 hours c) 1 hour c) 0.5 hours

PART – II

Note: (i) Answer any 15 questions. (ii) Answer in one or two sentences: (15x3=45)

31. State Heisenberg uncertainty principle?
32. The uncertainty in the position of a moving bullet of mass 10g is 10^{-5}m . Calculate the uncertainty in its velocity?
33. What are bonding and antibonding molecular orbitals?
34. why He_2 is not formed?
35. How will you measure the effective nuclear charge of the last electron in an atom whose electronic configuration is $1s^2 2s^2 2p^6 3s^2 3p^5$?
36. Why ionisation Energy of Be is greater than that of B?
37. Between the ionic radii of Na^+ , F^- , Which is smaller? Why?
38. Why B^{3+} ion is not formed?
39. Give any four uses of silicones?
40. Draw the structure of PCl_5 . What is the state of hybridization of phosphorous?
41. Why is HF not stored in glass bottles?
42. Sc^{3+} and Zn^{2+} ions are colourless, why?
43. How will you calculate the magnetic moment?
44. Explain the action of heat on copper sulphate?
45. Explain chrome plating?
46. Show that $\text{K}_2\text{Cr}_2\text{O}_7$ is a powerful oxidizing agent?
47. What are mish metals? Give their uses?
48. What is actinide contraction?
49. What are ligands? Give two examples?
50. Give an example for optical isomerism in complexes?
51. Explain binding energy?

PART – III

Note: (7x5=35)
(i) Answer any Seven questions choosing at least two questions from each section.

Section – A

52. Give the differences between a particle and a wave?
53. How will you verify the particle character of an electron?
54. Apply molecular orbital theory to oxygen molecule?
55. Explain how Pauling's method is used to calculate the ionic radii?

Section – B

56. How do electronegativity values help to identify the nature of the bond?
57. Discuss any five anomalous properties of fluorine?
58. Explain the uses of helium in
 - i) deep sea diving ii) meteorological observation
 - iii) magnetic resonance imaging (MRI)
 - iv) cryogenic agent v) medicine.
59. What happens when chromium reacts with
 - a) Conc. H_2SO_4 b) dil H_2SO_4 c) Conc. HNO_3 ?

Section – C

60. Explain Alumino thermic process with neat diagram?
61. Describe the extraction of lanthanides from monazite sand?
62. Explain coordination isomerism and ionization isomerism using a suitable example?
63. Explain radio carbon dating?

PART – IV

Note:

(4x10=40)

Answer question number 70 and any three from the remaining questions.

64. a) Write a note on intermolecular and intramolecular hydrogen bonding?
b) Explain Werner's theory of coordination compound.
65. a) Describe the Pauling's scale of determination of electronegativity?
b) How do electronegativity values help to find out percentage of ionic character in a polar covalent-bond?
66. a) What happens when the following compounds are hydrolysed.
i) PCl_3 ii) PCl_5 iii) P_2O_3 iv) P_2O_5 v) $\text{H}_4\text{P}_2\text{O}_7$
b) Explain the uses of helium?
67. a) How is purple of cassius prepared?
b) How is a copper extracted from its chief ore?
68. a) Write the name, central metal ion, ligands, coordination number and shape of $[\text{Cu}(\text{NH}_3)_4]\text{SO}_4$?
b) Write the IUPAC names of i) $[\text{Co}(\text{NH}_3)_5\text{H}_2\text{O}]\text{Cl}_3$ ii) $\text{Na}[\text{B}(\text{NO}_3)_4]$ iii) $[\text{Co}(\text{en})_2\text{Cl}_2]^+$ and iv) $\text{K}_3[\text{CoCl}_6]$ ii)
69. a) Give the differences between chemical and nuclear reactions?
b) Give the uses of radioactive isotopes in medicines?
70. a) An element A belongs to group number 15 and period number 3. One of its allotropic forms on heating with concentrated sodium hydroxide in an inert atmosphere gives a hydride (B) B reduces silver nitrate and forms an oxyacid of C. Identify A, B, and C. Explain the reactions.
b) An element A occupies group number 15 and period number 3, it reacts with limited supply of oxygen to give compound B which on hydrolysis yields compound C. Compound C reduces AgNO_3 to metallic Ag. Compound C on heating undergoes auto oxidation and reduction giving D and E. Identify A, B, C, D and E. Write the reactions.

(or)

- c) An element A in Group number 12, period number 4 is extracted from its Sulphide ore. A reacts with O_2 at 773K to give philosopher's wool. A reacts with hot NaOH to give compound C. A also reacts With dilute nitric acid and forms compound D with a liberatin of N_2O Find out A, B, C and D. Explain the reactions?
- d) Silver reacts with dil HNO_3 and gives compound A which on heating at 723K Gives B. B on further heating gives C. Further A reacts with KBr to give Compound D, which is highly useful in photography. Identify A, B, C and D. Explain the reactions.

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