LOYOLA COLLEGE (AUTONOMOUS) CHENNAI – 600 034

M.Sc. DEGREE EXAMINATION – CHEMISTRY
FIRST SEMESTER – NOVEMBER 2024
PCH1MC02 – CONCEPTS IN INORGANIC CHEMISTRY

Date: 11-11-2024   Dept. No.   Max. : 100 Marks
Time: 01:00 pm-04:00 pm

SECTION A – K1 (CO1)

Answer ALL the questions	**(5 x 1 = 5)**
1	**Fill in the blanks**
a)	……. is used as demasking agent in the separation of Cu and Cd.
b)	The number of atoms per unit cell in end centered lattice is ………. .
c)	Bent's rule is applicable only for unsymmetric ………… molecule.
d)	The acids which behave as strong acids in strong acid solvents are termed as …….... .
e)	……. is a slightly polarizable cation of small size bearing a high positive charge and having a noble gas configuration.

SECTION A – K2 (CO1)

Answer ALL the questions	**(5 x 1 = 5)**
2	**Answer the following**
a)	Name the diagram which is a plot of Gibbs free energy change against oxidation number.
b)	How is bcc structure formed?
c)	Define diffusion.
d)	Mention the type of hydrogen bonding involved in para-nitrophenol.
e)	CoF_6^{3-} is more stable than CoI_6^{3-} - Write the reason.

SECTION B – K3 (CO2)

Answer any THREE of the following	**(3 x 10 = 30)**
3	Explain the redox reactions of substances in aqueous and non-aqueous solutions.
4	Articulate the crystal structure of spinel and inverse spinel with a neat diagram and suitable example.
5	Predict the hybridization, geometry and shape of SF_6 and ClF_3 molecules using VB Theory.
6	Illustrate the chemical reactions of anhydrous sulphuric acid.
7	Explain the structural isomerism exhibited by coordination compounds.

	SECTION C – K4 (CO3)
	Answer any TWO of the following (2 x 12.5 = 25)
8	Derive the ground state term symbol for the following: (i) Cr^{3+} (ii) Fe^{3+} (iii) Cu^{2+} (iv) Co^{2+} (v) Ni^{2+}
9	State Fajan's rule. Outline any four applications of Fajan's rule.
10	Draw and explain the Molecular Orbital diagram of CO and HCl.
11	Explain various types of geometrical isomerism exhibited by 4- and 6-coordination complexes.
	SECTION D – K5 (CO4)
	Answer any ONE of the following (1 x 15 = 15)
12	a) Explain R-S or L-S coupling to derive ground state term symbol.
	b) Describe HSAB principle citing suitable examples. (8+7)
13	a) Evaluate the structure and hybridization of NO_3^- and I_3^-.
	b) What are metal excess defects? Explain their types with suitable examples. (8+7)
	SECTION E – K6 (CO5)
	Answer any ONE of the following (1 x 20 = 20)
14	a) Write the expression for Radial Probability of finding the electron in a radial shell between spheres. Draw the Radial Probability distribution curves of 2s and 3s orbitals.
	b) Describe the applications of ORD and CD in ascertaining the absolute configurations. (10+10)
15	a) In NaCl crystal, Cl^- ions from cubical closest packing and Na^+ ions occupy octahedral holes. What is the relationship between the edge length of unit cell and the radius of Cl^- ions? Calculate the ionic radius of Na^+ and Cl^- ions, if a = 500 pm.
	b) The dipole moment of PCl_2F_3 is non-zero while that of PCl_3F_2 is zero. Why?
	c) Explain any four types of non–covalent interactions exhibited by supramolecules. (4+6+10)