



Reg. No. :

Name :

Third Semester M.Sc. Degree Examination, January 2017

Branch : CHEMISTRY

**CL/CA/CH 231 : Inorganic Chemistry – III
(2013 Admission Onwards)**

Time : 3 Hours

Max. Marks : 75

SECTION – A

Answer **two** among **a), b)** and **c)** from **each** question and **each** question carries **2** marks.

1. a) The IR stretching frequency of CO in metal carbonyls is lower than that for free CO molecule. Why ?
b) What is meant by hapticity ? Explain with suitable examples.
c) How does fluxionality differ from tautomerism ?
2. a) Distinguish between thermodynamic stability and kinetic stability of complexes.
b) Presence of large ligands in the reacting complex favours dissociative mechanism of substitution in octahedral complexes. Justify.
c) Illustrate photoaquation reactions of metal complexes.
3. a) Differentiate between essential and trace elements in biological systems.
b) Give a note on the significance of $\text{Na}^+ - \text{K}^+$ pump in biological system.
c) Mention the role of 'Zn' in carboxypeptidase A.
4. a) What is superconductivity ? Give examples for superconducting materials.
b) What are Lasers ? Give their important applications.
c) State Curie and Curie – Weiss laws.



5. a) Write down the semiempirical mass equation and explain the asymmetry term.
- b) A neutron initiated fission reaction of ${}_{92}\text{U}^{235}$ yields ${}_{42}\text{Mo}^{97}$, two neutrons and an isotope of an element. Which is the element ?
- c) Nuclear reactors are usually built close to rivers or lakes. Why ? (2×10=20 Marks)

SECTION - B

Answer either a) or b) of each question and each question carries 5 marks.

6. a) Discuss the structure and bonding in Ferrocene.
- b) Discuss the mechanism of hydroformylation reaction.
7. a) What is trans effect ? How are 'cis' and trans $[\text{PtCl}_2(\text{NH}_3)\text{NO}_2]$ synthesized from $[\text{PtCl}_4]^{2-}$?
- b) Derive the rate law expression for substitution in octahedral complexes which takes place via dissociative mechanism.
8. a) Discuss the mechanism of oxygen binding in haemoglobin.
- b) What are Cytochromes ? Write down the important reactions catalysed by cytochrome P 450.
9. a) Give a brief note on dielectric properties of materials.
- b) Discuss the applications of piezo and pyroelectricity.
10. a) Derive the equation for radioactive decay and growth.
- b) What is meant by half life period ? Half life of radium is 1580 years and molar mass is 226 g mol^{-1} . Show that 1 g of radium gives 3.7×10^{10} disintegrations per second. (5×5=25 Marks)

SECTION - C

Answer any three questions. Each question carries 10 marks.

11. i) With suitable examples discuss the applications of Infrared spectroscopy for the elucidation of bonding in metal carbonyls.
- ii) Explain the mechanism of Hydrogenation.



12. i) Explain the mechanism of ligand substitution reactions in square planar complexes.
- ii) Give a comparison of Outer sphere Vs. Inner sphere mechanisms.
13. Discuss the structure and biological functions of
- i) Ferritin
 - ii) Transferrin
 - iii) Catalase
 - iv) Vitamin B₁₂
14. Give an account of different types of magnetism.
15. With the help of a diagram explain the principle and working of a nuclear reactor.
- (10×3=30 Marks)**
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