M – 7142

Reg. No. : ....

Name : ....

Third Semester M.Sc. Degree Examination, March 2022

Chemistry/Polymer Chemistry/Analytical Chemistry/Applied Chemistry

CH/CL/CA/PC 231 – INORGANIC CHEMISTRY – III

(Common for chemistry(2016 –2019 Admission) and polymer Chemistry(2018 – 2019 Admission))

Time : 3 Hours   Max. Marks : 75

SECTION – A

Answer any two among (a),(b),and (c) from each question.. **Each** sub question carries **2** mark.

1.   (a)   What are fluxional organometallics?

     (b)   What are insertion reactions? Give one example.

     (c)   What are the conditions to be fulfilled for reductive elimination reaction of complexes to proceed?

2.   (a)   Compare associative and dissociative mechanism for substitution reaction in octahedral complexes.

     (b)   What is photo-racemisation in complexes?

     (c)   Explain Fuoss Eigen equation.

3.   (a)   How is iron stored and transported in mammals?

     (b)   What are hemocyanins? Explain its functions.

     (c)   Give examples of reactions brought about by vitamin B_{12}.

4. (a) What changes takes place in ligand vibrations in IR spectra on coordination with metals?

   (b) How can Sn(II) and Sn(IV) distinguished using Mossbauer spectroscopy?

   (c) Calculate ESR frequency in magnetic field of 25000 Gauss, if g=2 $\beta = 9.271\times10^{-24}\,JT^{-1}$.

5. (a) Explain Radioactive equilibrium.

   (b) Give examples of photonuclear reactions.

   (c) Explain the applications of scintillation counter.

(10 $\times$ 2 = 20 Marks)

SECTION – B

Answer either (a) or (b) of each question. Each question carries **5** marks.

6. (a) Write the mechanism of hydrogenation of alkenes by organometallics.

   (b) Discuss the structure and bonding in alkene complexes.

7. (a) Discuss the reducing and oxidizing characteristics of $[Ru(bipy)3]2+[Ru(bipy)_3]^{2+}$.

   (b) What is trans effect? How is cis and trans $[Pt(NH_3)_4]^{2+}$ synthesised by the application of trans effect.

8. (a) Explain the role of sodium-potassium pump in biological systems.

   (b) Explain the structure and function of Cu-Zn SOD.

9. (a) What is the theory of Mossbauer spectroscopy?

   (b) Explain the use of ORD spectra in studying metal complex formation.

10. (a) How is half life related to decay consant? Plutonium decays with a half-life of 24000 years. If plutonium is stored for 72000 years,what will be the fraction of it that remains.

    (b) Distinguish between transient and secular equillibria?

                                                              (5 × 5 = 25 Marks)

SECTION – C

Answer any **three** questions. **Each** question carries **10** marks.

11. Discuss with suitable examples the usefulness of 18-electron rule in predicting the formation and stability of organometallic compound.

12. Give an account of photochemical reactions of metal complexes?

13. What is biological nitrogen fixation? Explain in the role of M-cluster and P-cluster of nitrogenase in nitrogen fixation.

14. How EPR spectra is used to study nature of bonding in copper(II) complexes?

15. Briefly explain nuclear reactions with examples.

                                                              (3 × 10 = 30 Marks)

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