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Reg. No. :

Name :

Third Semester M.Sc. Degree Examination, January 2016
Branch : CHEMISTRY
CH/CL/CA 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) Draw the structure of $\text{Mn}_2(\text{CO})_{10}$ and $\text{Fe}_2(\text{CO})_{12}$.
b) Give one method for the synthesis of Ferrocene.
c) What is Wilkinson catalyst ? Mention its application.
2. a) The reaction $[\text{Cr}(\text{H}_2\text{O})_6]^{2+} + [\text{Co}(\text{H}_2\text{O})_5\text{Cl}]^{2+} \rightarrow [\text{Cr}(\text{H}_2\text{O})_5\text{Cl}]^{2+} + [\text{Co}(\text{H}_2\text{O})_6]^{2+}$ is thought to proceed via an inner sphere mechanism. Write down the elementary steps involved in this reaction mechanism.
b) $[\text{Co}(\text{NH}_3)_5\text{X}]^{2+}$ undergoes acid hydrolysis as well as base hydrolysis. What are the products obtained by the above two hydrolysis ?
c) The aquation of $[\text{Co}(\text{NH}_3)_4\text{Cl}_2]^+$ is 10^3 times faster than that of $[\text{Co}(\text{NH}_3)_5\text{Cl}_2]^{2+}$. Why ?
3. a) Discuss the role of Magnesium in photosynthesis.
b) Explain the action of a copper containing metalloenzyme.
c) Discuss the role of P clusters in the Fe-Mo protein of nitrogenase.
4. a) What is photoconductivity ? Give examples for photoconducting materials.
b) Write down the applications of ferroelectricity .
c) Explain the term 'super exchange'.

P.T.O.



5. a) Give a note on liquid drop model of nucleus.
b) Distinguish between half life and average life. How are they related ?
c) Explain the source of energy of 'Sun'. (2×10=20 Marks)

SECTION – B

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

6. a) Explain the structure and bonding in butadiene complexes.
b) Write down one method of preparation each for allyl, Cyclopentadiene, cycloheptatriene and cyclooctatetraene complexes.
7. a) What is trans effect ? Propose a two step synthesis for 'cis' and trans $[\text{PtCl}_2(\text{NO}_2)\text{NH}_3]^-$.
b) Give an account of solvolytic reactions in octahedral complexes.
8. a) Explain the mechanism of Iron storage and transport in biological system.
b) Discuss the structural features and mechanism of Cu-Zn SOD.
9. a) Give short notes on :
i) Superconductivity and
ii) Photovoltaic effect.
b) Discuss the effect of temperature on magnetism.
10. a) Give a brief note on nuclear shell model.
b) What is meant by radioactive equilibrium ? The ratio between atoms of two radioactive elements A and B at equilibrium was found to be $3.1 \times 10^9 : 1$.
If the half life period of A is 2×10^{10} years, what is the half life period of B ?
(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 Hydroformylation reaction.
 12. i) List out the factors affecting the rate of substitution in octahedral complexes and discuss about any two of them.
ii) Arrange the following in the order of rate of substitution by H_2O and explain the reason for your answer.
 $[Co(NH_3)_6]^{3+}$, $[Rh(NH_3)_6]^{3+}$, $[Ir(NH_3)_6]^{3+}$.
 13. i) Discuss the function and significance of $Na^+ - K^+$ pump.
ii) Outline the structural features and mechanism of action of Carboxy peptidase A.
 14. Give an account of different types of magnetism.
 15. What is radiation dose ? Define the different units of radiation dose. Explain one method for the measurement of dose.
(10×3=30 Marks)
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