8. (a) How the difficulties of homogeneous catalytic systems were overcome by opting for supported homogeneous and phase transfer catalysis ?

(b) Write a detailed note on Zeigler Natta polymerisation of ethylene and propylene.

(c) Explain in detail about proofs that alkylidenes are involved in metathesis reaction of alkenes.

(d) Write the formula of a metallacycle which has been studied as metathesis catalyst.

Exam. Code : 210404
Subject Code : 4963

M.Sc. Chemistry 4th Semester

ADVANCED INORGANIC CHEMISTRY

Course—XXIII

Time Allowed—2 Hours] [Maximum Marks—75

Note :— There are ***eight*** questions of equal marks. Candidates are required to attempt any ***four*** questions.

1. (a) Explain the following in concern of photochemical reactions :

(i) Quantum yield

(ii) Franck-Condon principle

(iii) Grotthus-Draper law

(iv) Phosphorescence

(v) Stokes shift.

(b) With the help of Jablonski diagram discuss the phenomenon of intersystem crossing and interconversion. Why phosphorescence takes much longer time than fluorescence ?

(c) How Adamson's rules govern substitution lability ?

2. (a) Discuss the possible mechanism for the photochemical hydrogenation of butadiene by $Cr(CO)_6$.

   (b) Explain the CT photoactivation in $[Ru(bipy)_3]^{2+}$ complex.

   (c) Write a short note on photolysis of $Mo(cp)_2H_2$.

   (d) How Cr(III) is a particularly favourable system for study of photosubstitution reactions ?

3. (a) Explain how inorganic precursors are suitable to be used in photolysis of water.

   (b) Explain the process of photosynthesis in higher plants. Draw the molecular structure of chlorophyll a and explain how it is different from the structures of chlorophyll b and bacteriochlorophyll.

   (c) Which of the methods are suitable for characterisation of Metal-Hydride complexes ?

4. (a) Among $HV(CO)_4$ and $HV(CO)_3(PPh_3)$, which will be more acidic hydride and why ?

   (b) State three methods of preparation of complexes with M-H bonds.

   (c) Explain two main types of interactions of metal-hydrogen with C-H bonds.

   (d) Write a note on Molecular Hydrogen Compounds giving suitable examples.

5. (a) How the magnetic character of alkyl group may affect the insertion of nitric oxide into metal-methyl bonds ?

   (b) Complete the following reactions :

   $Cp_2ZrMe_2 + PhNCO \rightarrow ?$

   $Me_5WONMe + NO \rightarrow ?$

   (c) Discuss the effect of solvents on HCl addition to $[lrCl(CO)(PR_3)_2]$ compounds.

   (d) Explain with examples the Lewis base behaviour of metal atoms in complexes. Why Ferrocene can be protonated by strong acids only ?

6. (a) Explain the ways through which the migration of alkyl group to CO can be speeded up in insertion reactions.

   (b) What are insertion reactions ? Give four representative examples of 'insertion' reactions.

   (c) What is meant by orthometallation ? Give one example each of formation of 3, 4, 5 or 6 membered rings in cyclometallation reactions.

7. (a) Write about hydroformylation reaction of propylene using rhodium complexes. What are the technical advantages of using Rhodium process ?

   (b) Explain the catalytic scheme of carbonylation of butadiene.

   (c) Write a note on hydrosilation of unsaturated compounds.