

Total No. of Questions : 4]

SEAT No. :

P1349

[Total No. of Pages : 3

[5123]-36

M.Sc. (Part - II) (Semester - III)

INORGANIC CHEMISTRY

CH - 326 : Organometallic compounds of Transition metals &  
Homogeneous catalysis.

Time : 3 Hours]

[Max. Marks : 80

Instructions to the candidates:

- 1) All questions are compulsory and carry equal marks.
- 2) Figures to the right indicate full marks.
- 3) Use of log table and calculators are allowed
- 4) At. No = Mn = 25, Fe = 26, Co = 2, Cr = 24, Ir = 77.

Q1) Answer the following (any four)

[20]

- a) In a metal carbonyl compound, one carbonyl ligand is replaced by a strong  $\Pi$ -donor ligand. What will be effect on the carbonyl stretching frequency.
- b) Discuss the bonding interaction in metallocene
- c) Explain the metal-ligand interaction in metal-Nitrosyl
- d) Give the typical reactions of  $(\text{Cp})_2\text{TiCl}_2$
- e) What is EAN rule? Which of the following compounds obey EAN rule.
  - i)  $[\text{Mn}(\text{CO})_4(\text{NO})]^\circ$
  - ii)  $[\text{Cr}(\text{CO})_4(\text{PPh}_3)_3]$
  - iii)  $[\text{IrBr}_2(\text{CH}_3)(\text{CO})(\text{PPh}_3)]$
  - iv)  $[\text{Fe}(\eta^5\text{C}_5\text{H}_5)_2]$
  - v)  $[\text{Co}(\eta^5\text{C}_5\text{H}_5)_2]^+$

Q2) Attempt any four of the following

[20]

- a)  $\text{Co}_2(\text{CO})_8$  and  $\text{Fe}_2(\text{CO})_9$  are considered as carbonyl deficient compounds. Explain
- b) Describe the bonding in metal-alkene compounds. with suitable example.

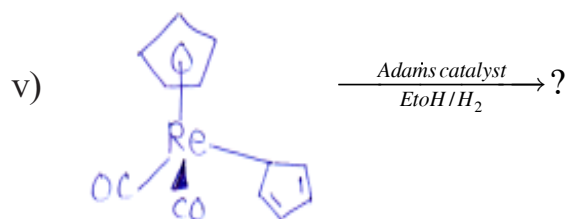
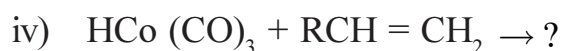
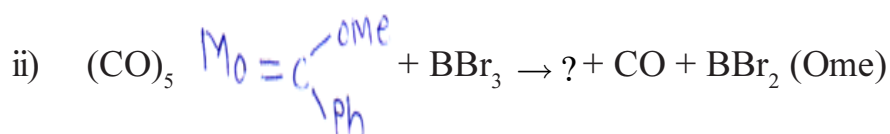
P.T.O.

- c) What is the role of carbene complex in the olefin metathesis reaction?
- d) In a metal-alkyne complex  $\nu(C \equiv C)$  is observed at  $1850 \text{ cm}^{-1}$ , while in the free alkyne  $\nu(C \equiv C)$  is observed approximately at  $2200 \text{ cm}^{-1}$ .
- e) Explain giving appropriate examples the oxidative addition and reductive elimination reactions shown by organometallic compounds.

**Q3)** Attempt any four of the following

**[20]**

- a) Explain the interdependence of inorganic & organometallic materials in the environment.
- b) Give a brief account of the preparative methods for organometallics compounds of transition metals.
- c) Write an account of methods of synthesis and properties of metal carbonyls.
- d) Complete the following reactions-
  - i)  $[\text{CpFe}(\text{CO})_2]_2 + \text{AlEt}_3 \rightarrow ?$



e) Draw the structures -

- i)  $[\text{Co}(\text{H})(\text{N}_2)(\text{PPh}_3)_3]$
- ii)  $[\text{Ir}(\text{Cl})(\text{CO})(\text{O}_2)(\text{PPh}_3)_2]$
- iii)  $\text{Re}_2(\text{Cl})_8]^{2-}$
- iv)  $\text{Co}_2(\text{CO})_8(\text{C}_2\text{R}_2)$
- v)  $\mu\text{-CO}[(\eta^4\text{-C}_4\text{H}_4)\text{Fe}(\text{CO})]_2$

**Q4)** Write short notes on - any four

**[20]**

- a) Tolmans catalytic cycle
- b) Hydrogenation of alkenes
- c) Group IV organometallics in medicine
- d) Heck Reaction
- e) Suzuki coupling.

