

Exam. Code : 210402

Subject Code : 4947

M.Sc. Chemistry 2nd Semester
ORGANOMETALLIC CHEMISTRY
Course—VIII

Time Allowed—2 Hours] [Maximum Marks—50

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

1. (a) Write a short note on carbolithiation reactions.
(b) Draw and briefly discuss the structures of $(\text{LiCH}_3)_4$
and $(\text{C}_5\text{H}_5)_2\text{Be}$.
(c) Give one method to prepare triethylaluminium.
What products do you expect when
triethylaluminium react with
 - (i) C_2Ph_2
 - (ii) $\text{C}_2\text{H}_5\text{OH}$?
2. (a) State EAN rule. Calculate the EAN value for
each of the following :
 - (i) $[\text{H}_2\text{Cr}(\text{CO})_5]$
 - (ii) $[\text{Fe}(\pi\text{-C}_5\text{H}_5)_2]$
 - (iii) $[(\pi\text{-C}_5\text{H}_5)\text{Fe}(\text{CO})_3]$
 - (iv) $[(\text{CH}_3)\text{Mn}(\text{CO})_5]$.
(b) Give two methods to prepare metal olefin
complexes. Explain the metal-olefin bonding in
terms of molecular orbital theory.

3. (a) How will you prepare cyclobutadiene transition metal complexes ? Also discuss nature of metal-ligand bonding in these complexes.
- (b) Suggest one method to prepare bis(benzene) chromium complexes. Also discuss the nature of bonding between benzene and chromium.
4. (a) Discuss the hydrolysis of coordinated :
(i) Amino acid ester and
(ii) Amide using suitable examples.
- (b) Write short notes on :
(i) Macrocyclic ligands
(ii) Modified aldol condensation.
5. (a) Draw the catalytic cycle involved in hydrosilation of ethylene. Also give description of what is happening at each step.
- (b) Describe in detail the olefin oxidation catalyzed by ethylene chloro complexes of palladium.
6. Draw and discuss catalytic loops for the following reactions :
(i) Monsanto acetic acid process
(ii) Oxo reaction.
7. (a) N_2 and CO are isoelectronic but M- N_2 complexes are much weaker than M-CO complexes. Offer a reasonable justification.
- (b) Give two methods to prepare metal carbonyls. Also discuss the nature of bonding involved in linear M-CO group in metal carbonyls. How does infrared spectroscopy help in characterization of metal carbonyls ?
8. (a) Write brief notes on :
(i) Dioxygen containing complexes
(ii) Dinitrogen containing complexes.
- (b) How will you prepare $Fe(CO)_5$? Write the possible products obtained when $Fe(CO)_5$ reacts with :
(i) OH^-
(ii) C_5H_6
(iii) PPh_3