PG – 102

IV Semester M.Sc. Degree Examination, June 2015
(NS Scheme)
CHEMISTRY
C401 – OC : Organometallic and Heterocyclic Chemistry

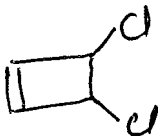
Time : 3 Hours Max. Marks : 80

***Instruction**: Answer question **1** and **any five** of the **remaining**.*

1. Answer **any ten** of the following : **(10×2=20)**

a) How is the presence of metal-metal bond useful in accounting for 18-electrons in $Mn_2(CO)_{10}$ and $CO_2(CO)_8$?

b) Give the product formed and account for its stability, in the following reaction :

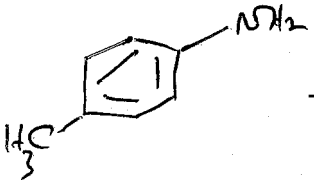


$+ Fe_2(CO)_9 \longrightarrow ?$

c) Illustrate the terms oxidative addition and reductive elimination with an example.

d) Mention a method for the synthesis of η^3 - allyl complexes.

e) What is hydrostannation ? Illustrate with an example.

f) 

$+ Hg(OAC)_2 \xrightarrow[\Delta]{ACOH} ?$

g) Account for the formation of Ethylene in the following reaction :

$CH_3 - CH_2 - O - CH_2 - CH_3 + BuLi \longrightarrow ?$

h) Give the structures of products A and B.

$$H_2N - CH_2 - CH_2 - OH \xrightarrow[ii)\ NaOH]{i)\ H_2SO_4} A \xrightarrow{H_2SO_3} B.$$

i) Suggest any two methods for the synthesis of 1,3,5-triazines with suitable examples.

j) Formulate any one reaction each for benzothiazole and benzofuran.

k) Sketch any one synthesis each for arsole and stibole.

l) What are rotaxanes ? Illustrate with an example.

2. a) Explain the steps involved in the Wacker process.

b) Account for the two products formed with mechanism in the following reaction :

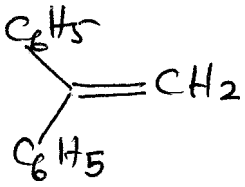
$$2\ C_6H_5 - CH = CH_2 + 2\ CO + H_2 \xrightarrow{CO_2(CO)_8} ? + ?$$

c) Account for the two products formed in the following reactions :

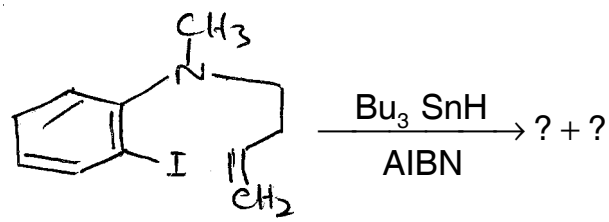
i) $ZnCl_2 + 2\ (C_2H_5)_3\ Al \longrightarrow ? + ?$

ii) $3\ SnCl_4 + 4\ (C_2H_5)_3\ Al + 4\ NaCl \longrightarrow ? + ?$ **(4+4+4=12)**

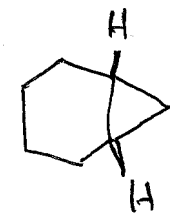
3. a) Explain how Peterson olefination can be employed for the synthesis of the following compound :



b) Give the structures of the two products formed with mechanism :



c) Illustrate how the following compound can be synthesised by Simmons-Smith reaction :

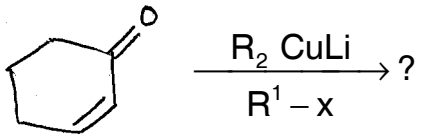


(4+4+4=12)

4. a) Account for the two products formed when Wilkinson's catalyst reacts with cinnamaldehyde.

   b) Describe the application of organo tellurium compounds in the synthesis of Biaryls.

   c) Give the product formed with mechanism.



(4+4+4=12)

5. a) Describe any two reactions of oxetanes.

   b) Discuss any two reactions of Thiepines.

   c) Illustrate with suitable example, the reaction of organolithium compounds with nitriles and isonitriles. **(4+4+4=12)**

6. a) Outline one method for the synthesis of :

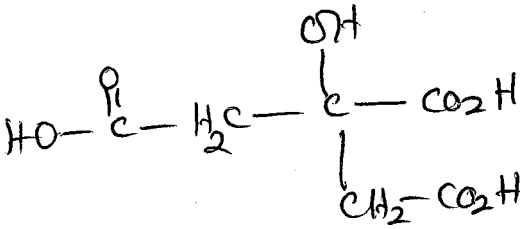
      i) Diazepines

      ii) Dioxocines.

   b) Sketch any two synthesis of 1,2-Diazines.

   c) Write a note on sydnone. **(4+4+4=12)**

7. a) Illustrate the application of reformatsky reaction in the synthesis of the following compound :



   b) Write a note on Felkin reaction.

   c) Give a brief account of organoselenium compounds. **(4+4+4=12)**