

Q.P. Code : 60787

Fourth Semester M.Sc. Degree Examination,
September/October 2020

(CBCS Scheme)

Chemistry

Paper C401-OC – ORGANOMETALLIC AND HETEROCYCLIC
CHEMISTRY

Time : 3 Hours]

[Max. Marks : 70

Instructions to Candidates : Answer Q.No. 1 and any five of the remaining.

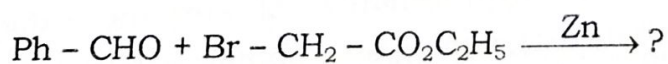
1. Answer any **TEN** of the following questions : (10 × 2 = 20)

(a) What is Felkin's reaction? Illustrate with an example.

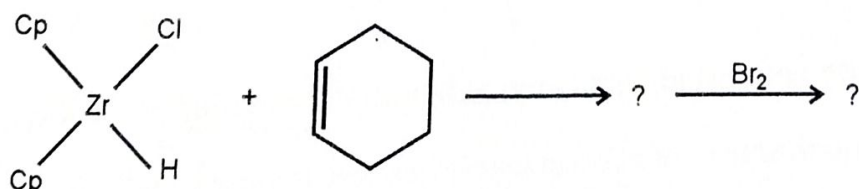
(b) Several of the catalytically important organometallic compounds are 16-electron, 4-coordinate square planar species. Comment on this statement.

(c) What is the catalytic species used in Wacker's process and how is it generated?

(d) Formulate the product(s) in the following with suitable mechanism :



(e) Give the products of the following reactions :

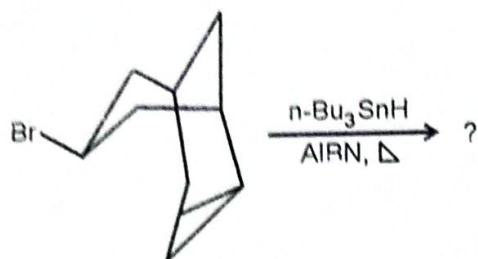


(f) What is hydrocyanation reaction? Mention its commercial importance.

(g) Give any two general methods of synthesis of organocerates.

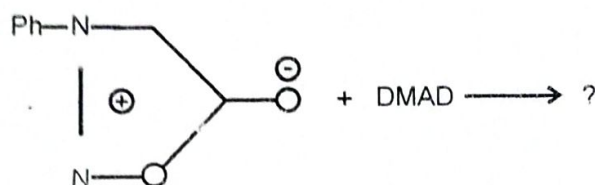
Q.P. Code : 60787

(h) Predict the product and outline the mechanism :

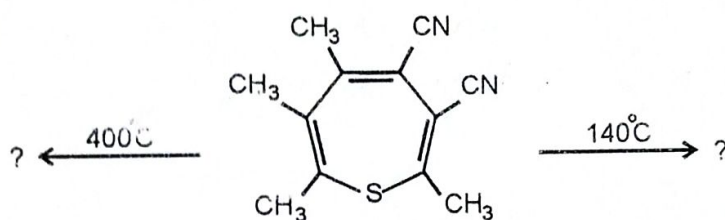


(i) What is the product formed when 2, 2 - dimethyloxirane is treated with dimethyloxosulfonium methylide?

(j) Write the product(s) in the following :



(k) Draw the structures of the products formed in the following reactions :



(l) Outline one method each for the synthesis of 5- and 6- membered Reterocyclic compound containing phosphorous.

2. (a) Give two examples each to illustrate nucleophilic and electrophilic cleavage of metal-carbon sigmal bond.

(b) Write the catalytic cycle for hydrogenation of ethylene catalysed by $(\text{Ph}_3\text{P})_3\text{RhCl}$. Indicate the rate determining step in the reaction.

(c) What is Heck reaction? Explain the mechanism using a suitable example.

(4 + 3 + 3)

3. (a) How is propene converted into butyraldehyde? Describe the catalytic cycle.

(b) Explain the mechanism of alkene isomerisation via metal allyl intermediate.

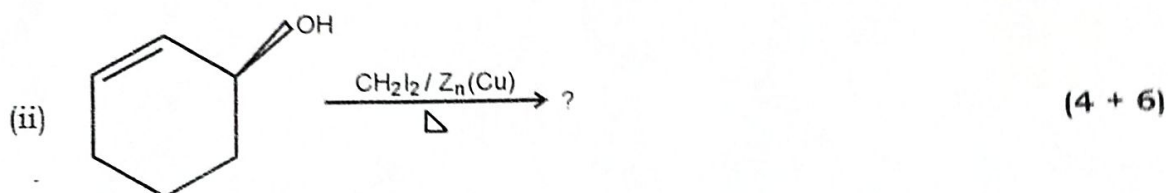
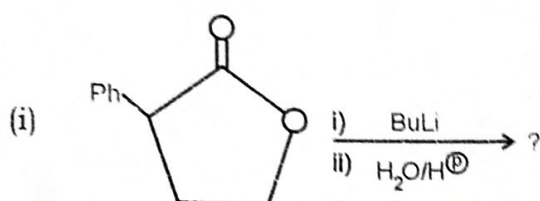
(c) How does cyclobutadiene complex with metals? Comment on its reactivity.

(4 + 3 + 3)

Q.P. Code : 60787

4. (a) Discuss the utility of organo-selenium compounds in the synthesis of alkenes and α, β -unsaturated carbonyl compounds.

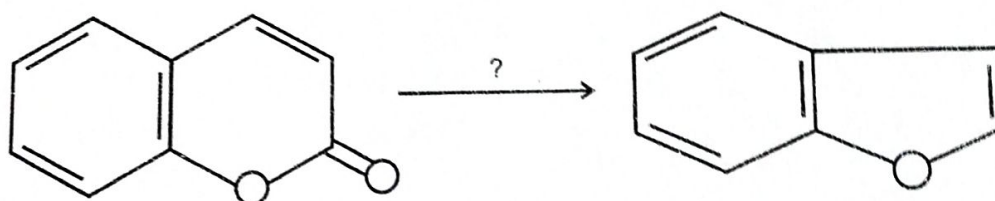
- (b) Predict the product and discuss the mechanism of the following reactions :



5. (a) Discuss with mechanism the Peterson olefination reaction for the stereospecific synthesis of E- and Z- alkenes.

- (b) Explain the mechanism of Barton decarboxylation.

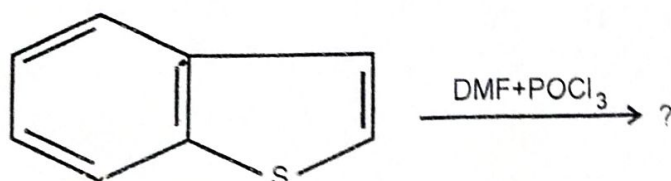
- (c) How do you bring about the following conversion :



(4 + 3 + 3)

6. (a) Discuss the preparation and reactions of organomercury compounds.

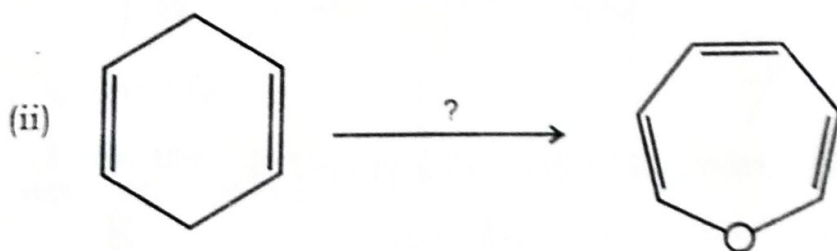
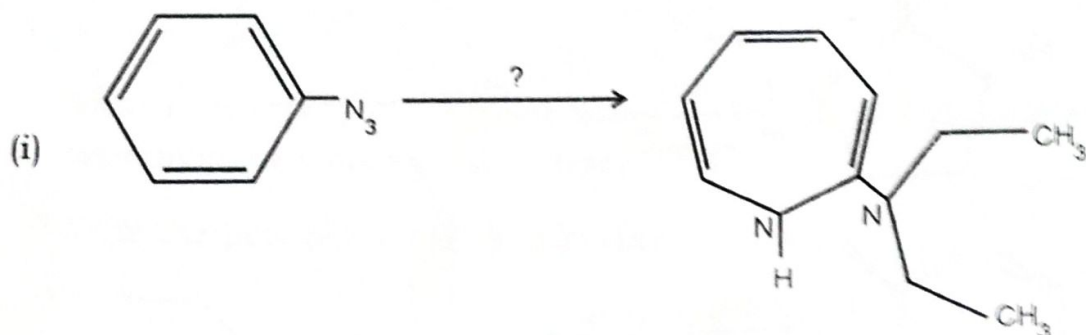
- (b) Identify the product in the following reaction and suggest the suitable mechanism :



- (c) Enumerate the steps involved in the synthesis of benzimidazoles. (4 + 3 + 3)

Q.P. Code : 60787

7. (a) Explain the synthesis of pyrimidine and with the help of resonance structure show the preferred position for electrophilic reactions.
- (b) Write the reagents/conditions and propose suitable mechanism for the following conversions :



(4 + 6)

8. (a) Formulate the reactions of Gilman reagent with epoxides and α, β - unsaturated carbonyl compounds.
- (b) Give an account of solvomercuration-de-mercuration reaction.
- (c) Outline a method for the synthesis of dithiocines and give any one reaction of them.

(4 + 3 + 3)