

M. Sc. CHEMISTRY EXAMINATION, 2023

(3rd Semester, CBCS)

PAPER: XII O**[ORGANIC CHEMISTRY SPECIAL]**

Time : Two Hours

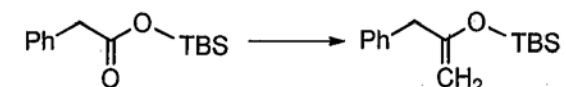
Full Marks : 40

(20 marks for each unit)

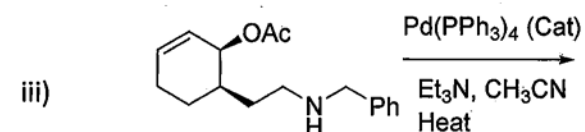
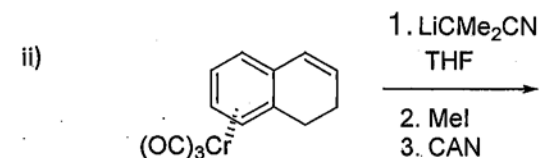
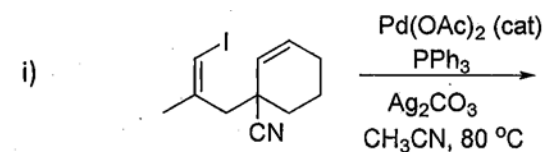
Use a separate answer script for each unit.

UNIT - O - 3121

1. (a) Mention the reagent required for the following transformation with plausible mechanism. 2



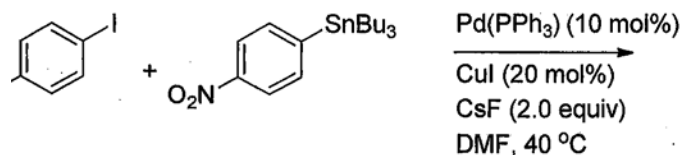
- (b) Predict the products of the following reactions and explain mechanistically the stereochemistry of the product (attempt any *two*) 3+3



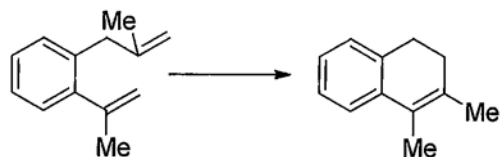
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[2]

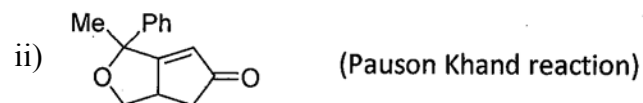
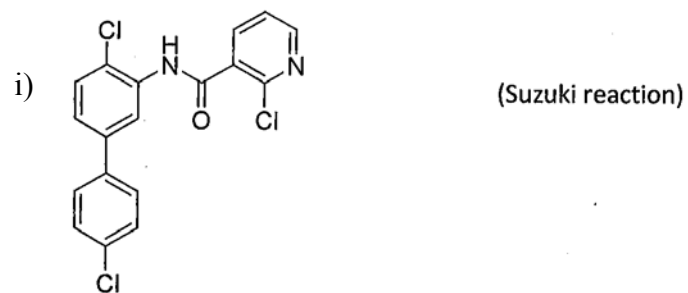
- (c) Predict the product and explain the role of CuI and CsF in the following reaction. 3



- (d) Which Grubbs' Catalyst would be your choice for carrying out the following transformation? Give reason with plausible mechanism. 3



- (e) Synthesise the following molecules from easily available starting materials using the reaction mentioned in the parenthesis in one of the steps. (attempt any *two*) 3+3



[5]

- (ix) What kind of information does the APT experiment provide? Briefly describe the mechanism of this technique.
- (x) Comment on the advantages of using HSQC, HMBC and DQF-COSY experiments on the elucidation of chemical structure of an organic compound.

[4]

3. Discuss the basic principle of mass spectrometry with a schematic diagram. Discuss, in short, how ions are formed in the following ion sources. 5

(i) ESI (ii) FAB.

4. Answer any **five** of the following questions : 2x5=10

(i) What do you understand by the term 'Polarization Transfer' in NMR spectroscopy and how does it help in recording NMR of insensitive nuclei?

(ii) What are the differences between INEPT and DEPT? Write down the signature of the peaks of C, CH, CH₂ and CH₃ in DEPT-45, DEPT-90 and DEPT-135.

(iii) What is Nuclear Overhauser Effect? State the condition for positive and negative NOE.

(iv) Explain the principle behind the Jeener Experiment (COSY) with proper pulse sequence.

(v) What is spin-echo experiment? Comment on its usefulness.

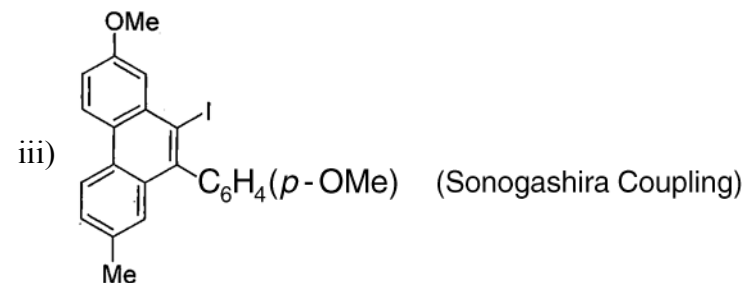
(vi) Account for the change in chemical shift value for ³¹P NMR of the following two compounds :

PCl₃ [δ (P) = 220 ppm] and PF₃ [δ (P) = 97 ppm].

(vii) What is difference NOE? Comment on its importance.

(viii) Explain the INEPT experiment with proper pulse sequence using vector representation in rotating frame.

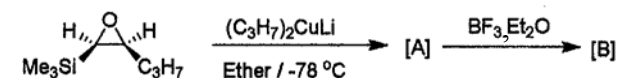
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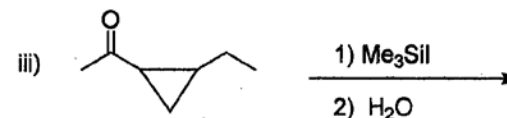
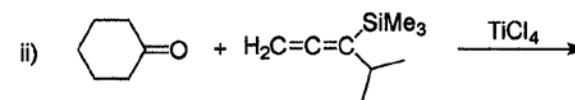
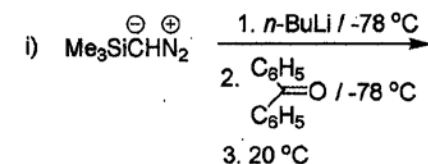
UNIT - O - 3122

2. (a) Write the steps for the synthesis of an allyl silane by Seyferth-Wittig reaction. 1

(b) Identify **A**, **B**, and **C** in the following reaction sequence with plausible mechanism where applicable. 1



(c) Predict the product(s) of the following reactions with plausible mechanism (any **two**) 1 ½ x2=3



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