

Total number of printed pages-5

14 (CHM-3) 303

2020

(Held in March 2021)

CHEMISTRY

Paper : CH-303

(Foundations of Organic Synthesis)

Full Marks : 60

Time : Three hours

The figures in the margin indicate full marks for the questions.

Answer **any six** questions from the following:

5×6=30

1. Give an example in each case and write the difference between —
 - (a) product stereoselective, and
 - (b) product stereospecific reactions.
2. Define the following terms :
 - (a) Retrosynthetic analysis
 - (b) Disconnection
 - (c) Functional group interconversionGive suitable examples to illustrate your answer.

Contd.

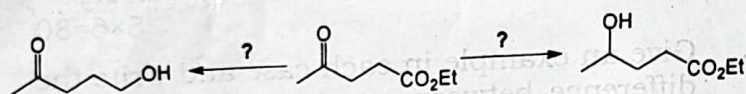
3. What are the characteristics of boron enolates? What are the advantages of boron enolates over metal enolates? Give the methods of preparation of boron enolates from ketenes and α -diazocarbonyl compounds.

4. Identify *one* method each for the selective protection-deprotection of—

(a) carbonyl groups, and

(b) alcohol groups.

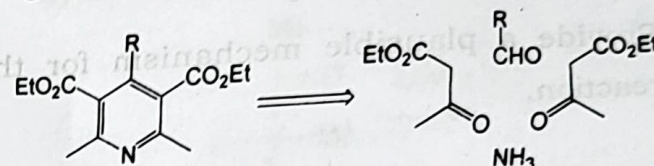
Using suitable protecting groups, show how the following transformations can be achieved:



5. Discuss the stereochemistry of the product formation in case of iodide-induced debromination of meso- and (\pm)-2,3-dibromobutane with probable mechanism.

6. What do you mean by asymmetric synthesis and asymmetric induction? What is the relation between enantiomeric excess (ee) and asymmetric induction?

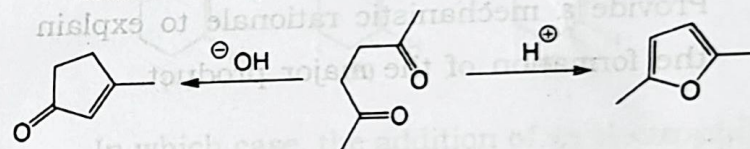
7. Complete the forward synthesis for the following pyridine derivative, based on the given analysis:



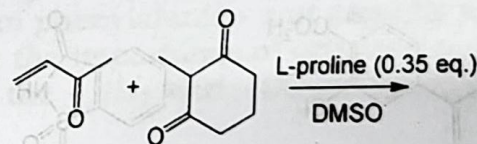
Answer **any six** questions from the following:

5×6=30

8. Illustrate the mechanistic pathways leading to cyclisation of hexan-2, 5-dione under acid and basic conditions:

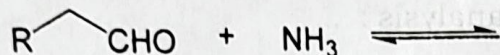


9. Predict the major product for the following reaction, indicating the stereochemical outcome:



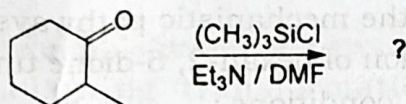
Propose a mechanism for the reaction.

10. What will be the major product for the following reaction :



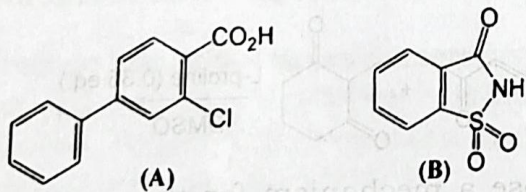
Provide a plausible mechanism for the reaction.

11. Complete the following reaction and identify the products (indicating the major and minor) :

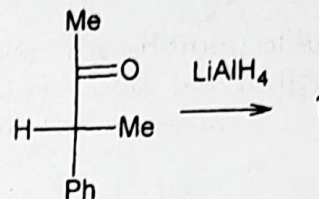


Provide a mechanistic rationale to explain the formation of the major product.

12. Give the retrosynthetic analysis for the following target molecules, and identify the starting materials :

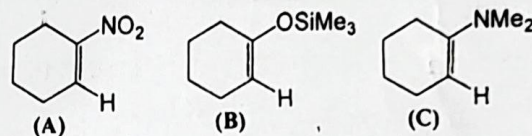


13. Using Felkin-Anh model, predict the major stereoisomer of the alcohol that will be formed in the following complex metal hydride reduction :



Discuss about the difference between Cram and Felkin-Anh models.

14. Consider following compounds A, B and C :



In which case, the addition of an electrophile over the C-H bond (as indicated) will be facile ? Give the reasons.

15. Design a synthesis for Aspartame starting from phenylalanine and aspartic acid. Point out the importance of orthogonal protection for the $-NH_2$ and $-COOH$ groups.