

MSc DEGREE EXAMINATION OCTOBER 2015

SEMESTER: 3, SUBJECT: CHEMISTRY

COURSE: P3CHET10-ORGANIC SYNTHESIS

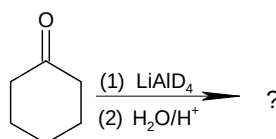
Time: Three Hours

Max. Marks: 75

SECTION A

(Answer any 10 questions. Each question carries 2 marks)

1. What is pyridinium chlorochromate? Mention its use in organic synthesis.
2. What is the product formed in the following reaction?



3. How will you prepare following alkene from the corresponding alkyne?

$\text{H}_3\text{C}-\text{CH}_2-\text{CH}=\text{CH}-\text{CH}_2-\text{CH}_3$
4. What is the product formed when acetophenone undergoes Baeyer-Villiger oxidation?
5. Discuss the use of SeO_2 in allylic oxidation. Write the mechanism of this reaction.
6. What is Gilman's reagent? Give any one of its uses in organic synthesis.
7. Write the structure of the product formed when naphthalene is subjected to Birch reduction with sodium in liquid ammonia in the presence of dry ethanol at low temperatures (-78°C).
8. What is DIBAL reagent? How does its reactivity differ from that of LiAlH_4 ?
9. What is red-Al? Write its structure and predict the product formed when methyl acetate is reduced with this reagent.
10. Suggest suitable synthetic equivalents for following synthones: (a) $\text{CH}_3-\text{CH}_2^+$ (b) $^+\text{CH}_2-\text{OH}$
11. What are the products formed when following compounds are reacted with sodium borohydride and lithium aluminium hydride: (a) acetone (b) methyl acetate (c) acetic acid
12. Mention the use of DCC in peptide synthesis.

13. Write the mechanism of epoxidation of alkenes using peracids.

(10 × 2 = 20)

(PTO)

SECTION B

(Answer any 5 questions. Each question carries 5 marks)

14. Discuss with mechanism following coupling reactions (a) Suzuki coupling (b) Stille coupling.

15. Briefly explain the basic steps involved in the biosynthesis of carbohydrates.

16. What is meant by the term Umpolung? Write any organic synthesis involving the use of this method.

17. On the basis of a retrosynthetic analysis on $\text{CH}_3\text{-CH}_2\text{-CH}_2\text{-CO-Ph}$ suggest a suitable synthetic strategy for preparing this compound.

18. Write the mechanism of following reaction: based on mechanism explain why NBS brings about allylic bromination rather addition of bromine to double bond.



19. What is click reaction? Give a suitable example for the synthesis of an organic compound using this technique.

20. What is Nazarov cyclization reaction? Explain its mechanism.

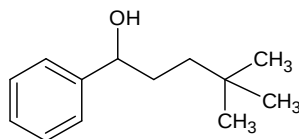
21. What is Noyori asymmetric hydrogenation reaction? Explain how both enantiomers of $\text{CH}_3\text{-CH(OH)-CH}_2\text{-CO-OCH}_3$ are obtained from $\text{CH}_3\text{-CO-CH}_2\text{-CO-OCH}_3$ using this reaction. Write the mechanism involved in the reduction.

(6 × 5 = 30 marks)

SECTION C

(Answer any 2 questions. Each question carries 15 marks)

22. Discuss the basic principles of retro synthesis. Suggest a suitable retrosynthetic strategy for the synthesis of the following compound.



23. Write a note on the use protecting groups in solution phase and solid phase peptide synthesis.
24. (i) Explain with mechanism following metal based reductions: (a) Birch reduction of benzene, anisole and benzoic acid (b) pinacol reaction (c) dissolving metal reduction of alkynes. (10 marks)
- (ii) Explain the mechanism of hydrogen reduction of alkenes using the Wilkinson's catalyst. (5 marks)
25. Discuss with mechanism following cyclization reactions (a) Pauson-Khand reaction (b) Bergman cyclization (c) Mitsunobu reaction (d) radical-olefin cyclization. (15 × 2 = 30)
