LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

M.Sc. DEGREE EXAMINATION – **CHEMISTRY**

FOURTH SEMESTER – **APRIL 2022**

PCH 4501 – ORGANIC SYNTHESIS AND PHOTOCHEMISTRY

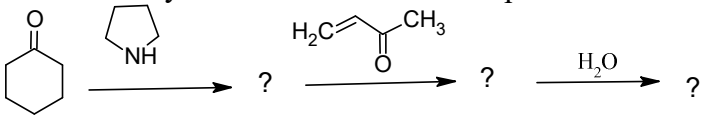
Date: 15-06-2022 Dept. No. Max. : 100 Marks

Time: 01:00 PM - 04:00 PM

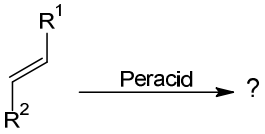
PART-A

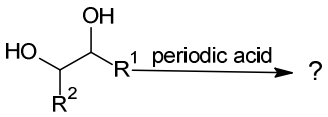
Answer ALL Questions. **(10 x 2 = 20)**

1. Mention any two advantages of LDA over n-butyllithium.
2. Identify the intermediate and the product in the following reaction.

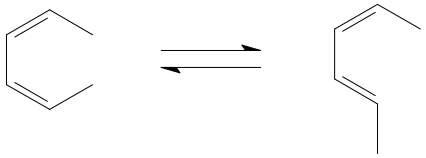


3. Predict the products in the following conversions.





4. What is the product formed when quinhydrol is electrochemically oxidised?
5. What is functional group addition? How is it performed during a real synthesis? Give an example.
6. What type of synthons are used during 1,2-difunctional compound synthesis? Give an example.
7. What are the salient features of pericyclic reactions?
8. Effect the following conversion.

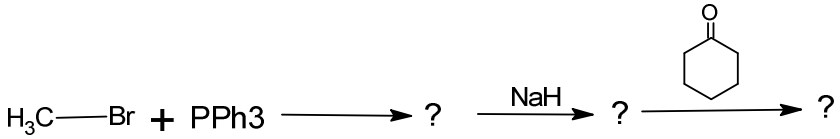


9. What is Leukart reduction? Give an example.
10. Differentiate between photophysical and photochemical processes.

PART – B

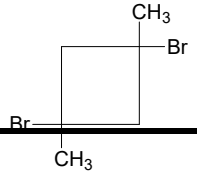
Answer any EIGHT Questions. **(8 x 5 = 40)**

11. Draw the structure of 18-Crown-6 and explain its synthetic applications.
12. Complete the following scheme and justify with suitable mechanism.



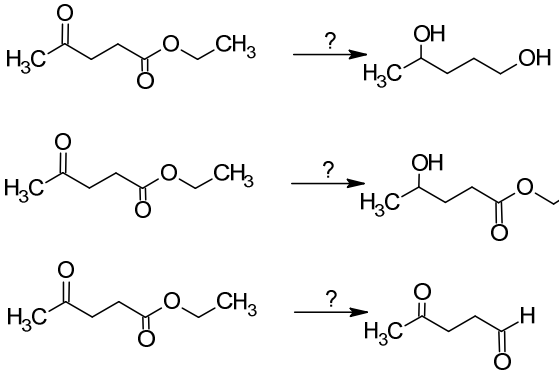
13. Outline the mechanism of Sharpless asymmetric epoxidation.
14. Predict the products in the following electrochemical reactions.

(a) Electro-reduction of (i) benzyl bromide and (ii)



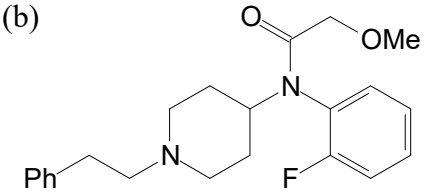
(b) Electro-oxidation of $Ph_2CHCH_2COO^-$

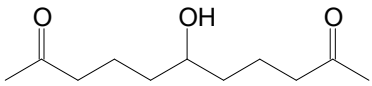
15. Identify the suitable reagents for the following conversions.



16. Draw the correlation diagram for the electrocyclization of 1,3-butadiene involving *con*-rotation. Predict whether the reaction is thermally or photochemically allowed.
17. How is degenerate sigmatropic rearrangement explained in bullvalene? Draw at least 4 rearranged structures.
18. FGI is a more beneficial retrosynthetic conversion. Justify it with suitable examples.
19. Explain the retrosynthetic analysis of the following compounds.

(a) (b)





20. How are protecting groups helpful to overcome chemoselectivity in reactions? Explain them with any two examples.
21. Analyse the photophysical processes with the neat sketch of Jablonski Diagram.
22. Write a note on the photoreduction reactions.

PART – C

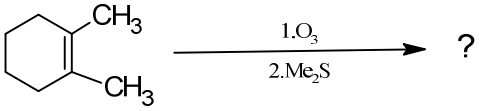
Answer any FOUR Questions. **(4 x 10 = 40)**

23 (a) Investigate the mechanism of Ziegler-Natta catalyst in stereoregular polymerization process. **(6)**

(b) Delineate the application of silane reagents as protecting groups. **(4)**

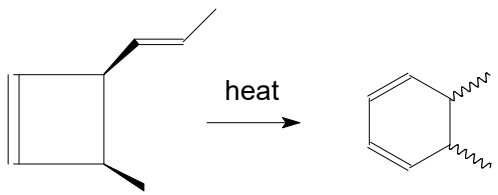
24 (a) Compare the Heck and Sonogashira coupling reactions. **(6)**

(b) Formulate a mechanism to find out the product. **(4)**



25 (a) How is nitrobenzene electrochemically reduced under (i) strongly acidic and (ii) weakly acidic conditions. **(3+3)**

(b) Write the mechanism of the following reaction and predict the stereochemistry of the product. **(4)**



26 (a) Give an example for [9,9]-sigmatropic rearrangement and write the mechanism of the reaction. **(5)**

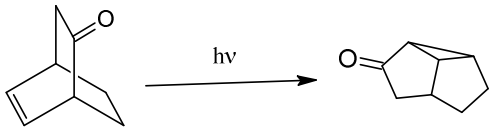
(b) Why is stepwise synthesis less yielding than convergent synthesis? Give suitable reasons. **(5)**

27 (a) How are C-C disconnections carried out systematically? Explain any two methods in detail. **(5)**

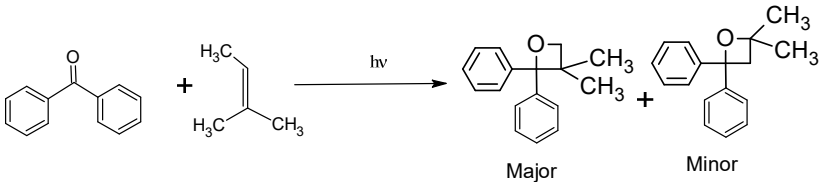
(b) Explain any one method each of 1,2- and 1,3-difunctional compound synthesis. **(5)**

28. Account for the following conversions. **(3+3+4)**

(i)

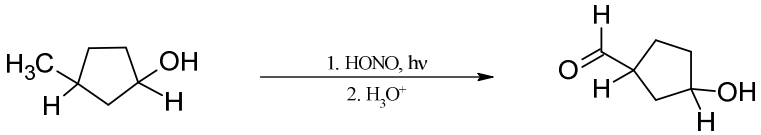


(ii)



Major Minor

(iii)



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