LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

B.Sc. DEGREE EXAMINATION – **CHEMISTRY**

SIXTH SEMESTER – **APRIL 2013**

CH 6609/CH 6603 - SYNTHETICS ORGANIC CHEMISTRY AND SPECTROSCOPY

Date: 03/05/2013 Dept. No. Max. : 100 Marks

Time: 1:00 - 4:00

PART A

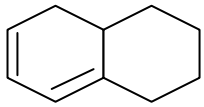
Answer All questions **10 x 2 = 20**

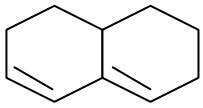
1. **State the guiding principles in choosing alternate synthetic routes.**
2. **What are activating groups? Explain it with an example.**
3. **Complete the following reactions**

i) $C_6H_5\text{-}CH{=}CH\text{-}\overset{\overset{O}{\|}}{C}\text{-}C_6H_5 \xrightarrow[EtOAc]{Pt}$

ii) $CH_3\text{-}CH_2\text{-}C{\equiv}C\text{-}CH_2\text{-}CH_3 \xrightarrow{(BH_3)_2\text{-}THF}$

4. **What is Wolf Kishner reduction?**
5. **What is the structure of the aldol product from propanal?**
6. **The methylenic protons in ethylacetoacetate are found to be acidic. Why?**
7. **Calculate λmax for the following**

a) 

b) 

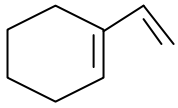
8. **Cis 1,2-dichloro ethene is IR active while trans 1,2 dichloro ethene is IR inactive. Give reason**
9. **What is spin-spin splitting?**
10. **What do you understand by Nitrogen rule?**

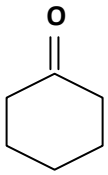
PART B

Answer any Eight questions **8 x 5 = 40**

11. **What are protecting groups? Highlight the use of protecting groups in organic synthesis with an example.**
12. **Write a note on convergent synthesis.**
13. **What do you mean by retro synthetic analysis? Explain.**
14. **Give the mechanism of Clemmensen reduction.**
15. **Discuss the role of Cr (VI) as oxidizing agent.**

16. **Complete the following reactions**

a)  + Maleic anhydride ⟶

b)  ⟶ NaOH

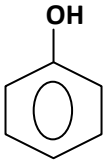
c) $C_6H_5CHO + (CH_3CO)_2O \xrightarrow{CH_3COONa}$

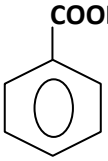
17. **How will you distinguish inter and intra molecular hydrogen bonding using IR spectroscopy?**
18. **An organic compound with molecular formula C_8H_6 decolourises bromine water and gives a white precipitate with ammoniacal silver nitrate. Give the probable structure of the compound. Its IR spectrum gives a band at 2150-2200 cm^{-1} and near 3300 cm^{-1}.**
19. **Explain McLafferty rearrangement with a suitable example.**
20. **What do you mean by shielding and deshielding of a nucleus?**
21. **What is TMS? Why it is chosen as a reference standard in NMR?**
22. **Discuss the mechanism of Diels Alder reaction.**

PART C

Answer any four questions **4 x 10 = 40**

23. **a) Explain Umpolung synthesis.** **(5)**
    b) How will you convert benzaldehyde to benzyl phenyl ketone using the above method. **(5)**
24. **a) Compare the reducing action of $LiAlH_4$ and $NaBH_4$ and highlight its significance.** **(6)**
    b) What is Birch reduction?

i)  ⟶ Na / liq NH_3

ii)  ⟶ Na / liq NH_3

25. **How will you synthesis the following from acetoaceticester**
    a) **Cinnamic acid** b) **Succinic acid** c) **2-pentanone** d) **4-methyl uracil**
    b) **a)How will you distinguish the following using IR spectroscopy:** **(6)**
        i. **Cis and trans cinammic acid**
        ii. **CH_3CONH_2 and $CH_3CH_2NH_2$**
        iii. **o-hydroxy benzoic acid and p-hydroxy benzoic acid.**
    c) **What are the various types of electronic transitions and give its energy diagram.** **(4)**

26. a) A compound with molecular formula $C_9H_{10}O_2$ gave the following spectral data. (6)

UV λmax 274 nm

IR 3031cm^{-1}, 2941 cm-1, 1725 cm^{-1}and 1060 cm^{-1}

NMR 2.35δ (s, 3H), 3.9δ (s, 3H) and an unsymmetrical pattern 7.2δ (4H)

b) Mention the advantages of ^{13}C NMR spectroscopy in structure determination. (4)

27. a) An organic compound with molecular formula $C_6H_{12}O$ gives a positive iodoform test. It showed two peaks in NMR. Find the structural formula (6)

NMR 2.1δ (s, 3H), 1.1 δ (s, 9H)

b) Discuss the mechanism of aldol condensation. (4)