LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

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

SIXTH SEMESTER – **APRIL 2018**

CH 6609– SYNTHETICS ORGANIC CHEMISTRY AND SPECTROSCOPY

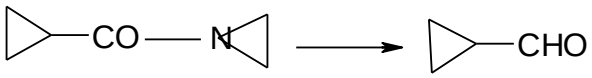
Date: 03-05-2018 Dept. No. Max. : 100 Marks

Time: 01:00-04:00

PART-A

Answer all questions **(10×2=20)**

1. Define the term regiospecificity.
2. What do you mean by a precursor?
3. What is Jones reagent? What is its usefulness?
4. Name the reagents used for the following conversions

a) 

b) R-CO-R' → RCOOR'

5. Predict the product in the following reactions:

Δ

a) 1, 3-Butadiene+ Acrolein →?

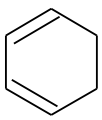
Δ

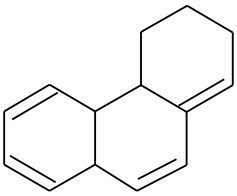
a) 1, 3-Butadiene+ Maleic anhydride →?

6. What is meant by an active methylene group? Give an example.
7. Which will absorb at shorter wavelength region? Why?

Cis – stilbene or Trans - stilbene

8. Calculate the λ max for the following compounds

a) 

b) 

9. What is coupling constant?
10. How will you distinguish between ortho and p – hydroxybenzaldehyde from their IR spectra?

PART-B

Answer any EIGHT questions **(8×5=40)**

11. Enumerate the advantages of retro synthetic approach.

12. Write a note on reversal of polarity.

13. What do you mean by functional group transposition? Explain it with an example.

14. What is DIBAL? Explain its usefulness in organic synthesis.

15. Outline the mechanism of Clemmenson's reduction with an example.

16. Write the mechanism of crossed –aldol condensation reaction with an example.

17. Write the mechanism of Keto-enoltautomerism taking ethyl acetoacetate as a reference compound.

18. How are the following compounds distinguished from their IR spectra.

    $C_6H_5COCH_2CH_3$ and $C_6H_5CH_2COCH_3$

19. An organic compound A with Molecular formula C_3H_9N shows the following peaks in the IR spectrum.

    3012 cm^{-1} (m), 3423cm^{-1} (s) , 3236 cm^{-1} (m)and 1615cm^{-1} (m)

    When the compound A is treated with HNO_2, we get a compound B which shows a strong peak at 3430 cm^{-1}.

    What are A and B and explain the reactions involved?

20. What is spin-spin coupling? Explain it with an example.

21. Write the mechanism of McClafferty rearrangement.

22. State and explain nitrogen rule with an example.

PART-C

Answer any FOUR questions **(4×10=40)**

23. Explain the usefulness of the following in modern organic synthesis. **(5+5)**

    a) Activating groups b) Bridging elements

24. Predict the products in the following reactions and suggest a suitable mechanism. **(5+5)**

    a) Acetophenone $\xrightarrow{\text{Zn (Hg), HCl}}$?

$NaBH_4$ / H^+, H_2O

b) Cinnamaldehyde ----------→?

25. a) Write the mechanism of Baeyer – Villiger oxidation taking an appropriate example. **(5)**

b) Predict the product in the following reaction and suggest a suitable mechanism. **(5)**

Base

Cinnamaldehyde + Diethylmalonate ----------→?

26. a) A cyclic ketone A (C_5H_8O) on reaction with $NaOCH_3$ gives a product B which has the following spectral properties.

IR: 1740cm^{-1} (s), 1160cm^{-1} (s)

UV: Transparent above 200nm

^{1}H-NMR: δ3.6 (3H, S), δ1.2 (9H S)

Mass: m/z 116, 85, 59, 31.

Deduce the structure of A and B.

b) Why is TMS chosen as a reference compound in NMR spectroscopy? **(6+4)**

27. Discuss the use of IR spectroscopy in distinguishing between inter and intra molecular hydrogen bonding.

28. a) How will you distinguish between 3-methyl and 4-methyl cyclohexene on the basis of mass spectroscopy?

b) Mass spectra of acetone, propionaldehyde and ethyl methylketone show strong peaks at m/z values of 43, 57 and 57 respectively. Suggest a possible origin for each of these peaks.

c) Write a note on the concept of see back in organic synthesis. **(3+3+4)**

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