

18/05/24

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Reg. No. : .....

Name : .....

Third Semester M.Sc. Degree Examination, February 2024

Chemistry / Analytical Chemistry / Polymer Chemistry

CH 232 / CL 232 / PC 232 : ORGANIC CHEMISTRY – III

(2020 Admission Onwards)

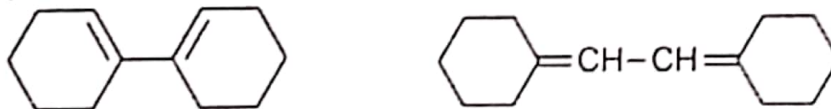
Time : 3 Hours

Max. Marks : 75

SECTION – A

Answer two among (a), (b) and (c) from each. Each sub question carries 2 marks.

1. (a) Among the following dienes which one will observe at lower wavelength? Why?

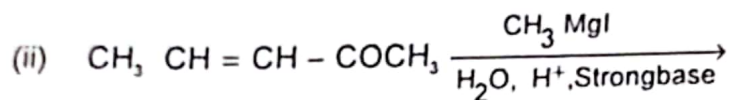
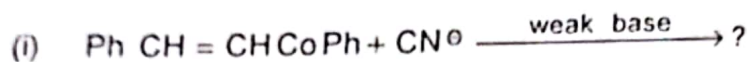


- (b) An intense peak at  $m/e$ : 149 is observed in the mass spectrum of diethyl phthalate. Account for this.
- (c) Two  $\gamma$ - lactones having double bond give absorption at  $1800\text{ cm}^{-1}$  and  $1750\text{ cm}^{-1}$ . Write the structure and assign the value for each compound.
2. (a) An organic compound molecular formula  $\text{C}_4\text{H}_9\text{NO}$  shows  $^1\text{H}$  - NMR peaks at  $\delta$  (ppm): 2.9 (t, 4H), 3.8 (t, 4H), 1.8 (broad s, 1H) assign a suitable structure.
- (b) The  $^{13}\text{C}$ -NMR spectrum of one of the butyl acetate isomers ( $\text{C}_4\text{H}_9\text{OCOCH}_3$ ) shows signal at  $\delta_c$  22, 28, 80 and 170 what is its structure? (Intensity of peak at  $\delta_c$  28 much more intense than that  $\delta_c$  22)
- (c) Predict the chemical shift position for the protons in 4-nitroanisole.

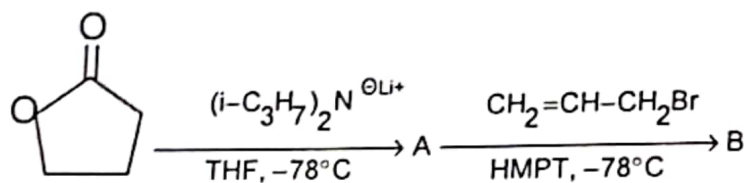
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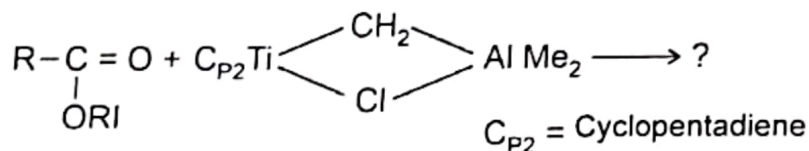
3. (a) Complete the following :



(b) Predict the structure of product A and B in the reaction given below.

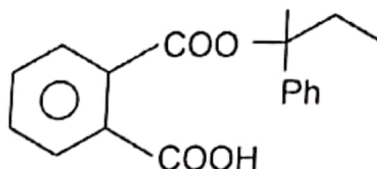


(c) Predict the product in the following :



4. (a) Give any two protecting groups for phenols.

(b) Suggest a retro synthetic route for the following compounds.



(c) Why cyanide ions ( $\text{CN}^-$ ) is a highly specific catalyst for the benzoin condensation?

5. (a) What is Jones oxidation reaction?

(b) Illustrate the use of borohydride for the transformation of isopropanol to *n*-propanol.

(c) Write the main product of reaction between *o*-dichlorobenzene and sodamide.

(10 × 2 = 20 Marks)



SECTION – B

Answer either (a) or (b) from each question. Each sub question carries 5 marks.

6. (a) Write all Possible isomers of molecular formula  $C_6H_6O$  whole UV band exhibit at  $\lambda_{max}$  187 nm (high intensity) and at  $\lambda_{max}$  280 nm with low intensity.

(b) Show the mass fragmentation pattern of 3-Methyl pyridines.

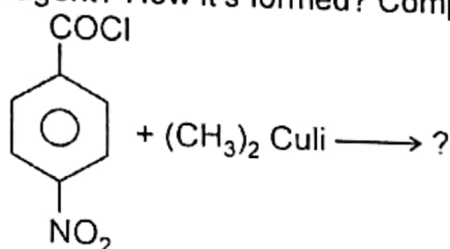
7. (a) Assign the structure of the compound on the basis of spectral data.

UV  $\lambda_{max}$  : No band above 200 nm; IR :  $\nu_{max}$  :  $1740\text{ cm}^{-1}$

$^1\text{HNMR } \delta = 4.0\text{ (t, 2, H)}; 2.2\text{ (m, 2H)}; 2.3\text{ (m, 1H)}; 1.15\text{ (s, 3H)}$

(b) Write a note on shift reagent in NMR spectroscopy.

8. (a) What is Gillman reagent? How it's formed? Complete the following.



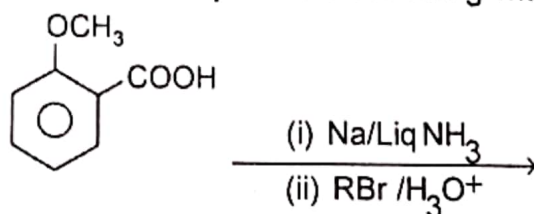
(b) Write a note on 1,2 and 1, 4- enone addition reactions.

9. (a) Explain stork enamine acylation reaction. Outline its mechanism.

(b) What is Umpolung? Explain.

10. (a) How is Tri-n-butyl tinhydride  $((n - \text{Bu})_3\text{Sn}_4)$  prepared where it is used in the field of organic group transformation; Explain it with suitable examples.

(b) Explain Birch reduction. Complete the following with mechanism.



(5 × 5 = 25 Marks)



SECTION – C

Answer any **three** questions. Each question carries **10** marks.

11. (a) Explain the EI in mass spectroscopy.
- (b) Summarize the general trends of structural variation on the position of carbonyl stretching frequency in IR spectra.
12. Three isomeric compound,  $C_4H_8O_3$  give the following  $^1H$  spectra. Deduce the possible structure for them.
- Compound 1 :  $\delta$  1.3 (t, 3H,  $J = 7$  Hz); 3.6 (q, 2 Hz,  $J = 7$  Hz); 4.15 (s, 2 H); 12.1 (s, 1H) ppm.
- Compound 2 : 1.2 (d, 3H,  $J=7$  Hz); 2.3 (d, 2 H,  $J = 7$  Hz); 4.15 (1:5:10:10:5:1 sextet, 1H,  $J= 7$  Hz) ppm (Spectrum run in  $D_2O$ )
- Compound 3: 3.5 (s, 3H); 3.8 (s, 3H) 4.08 (s, 2H) ppm
13. Write notes on :
- (a) Silane carbanion and its reaction.
- (b) Alkynyl Cu (I) reagents.
14. Explain the following :
- (a) Creation of cis and trans double bonds.
- (b) Stepens-Castro coupling reactions.
15. Give a brief account on application of following reagents in organic synthesis.
- (a)  $OsO_4$
- (b) DIBAL-H

**(3 × 10 = 30 Marks)**

