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B.Sc/4th Sem (H)/CHEM/23(CBCS)

2023

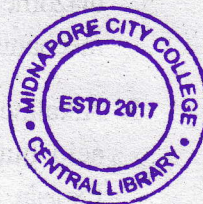
4th Semester Examination

CHEMISTRY (Honours)

Paper : C 10-T

(Organic Chemistry-IV)

[CBCS]



Full Marks : 40

Time : Two Hours

*The figures in the margin indicate full marks.
Candidates are required to give their answers
in their own words as far as practicable.*

Group - A

Answer any *five* questions : $2 \times 5 = 10$

1. Explain the following :

- (i) Ethylene fails to show any IR signals around 1600 cm^{-1} .
- (ii) Can D_2O be used as a solvent in $^1\text{H-NMR}$ studies?

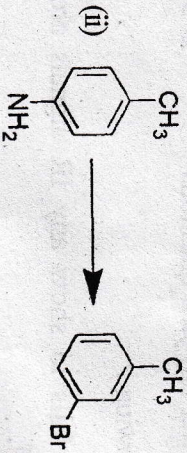
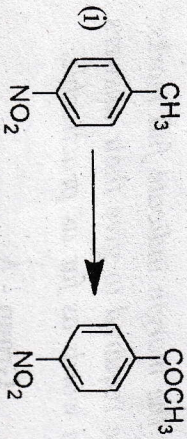
2. Write a note on symmetry restriction in electronic transition.

P.T.O.

(2)

3. How can you distinguish chemically between N-methylaniline and N,N-dimethylaniline?
4. In the Arndt-Ester synthesis two equivalents of diazomethane is used. — Explain the statement showing mechanism of the reaction.
5. Alkaline hydrolysis of benzonitrile affords the salt of an acid but in presence of H_2O_2 an amide is formed — Explain.

6. Transform the following :

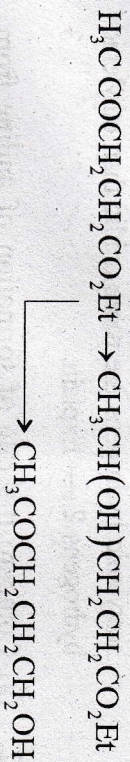


7. How you can distinguish between the following pairs :

- (i) CH_3CH_2Br and CH_3CH_2OH (ordinary grade) by NMR.
- (ii) Methylbenzoate and Phenylacetate by IR.

(3)

8. Convert the following :



Group - B

Answer any *four* questions : 5×4=20

9. (a) Complete the following reaction scheme with plausible mechanism. 3



(b) How can IR spectroscopy distinguish between 1-hexyne, 2-hexyne, and 3-hexyne? 2

10. (a) An organic compound (S) C_8H_9ON on treatment with H_2SO_4 isomerizes to (T) which on hydrolysis furnishes aniline and acetic acid. What are (S) and (T)? Explain the above fact and show mechanism of isomerization step only. 3

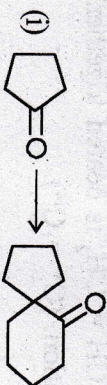
(b) How *o*-nitroaniline can be distinguished from *p*-nitroaniline by UV-spectroscopy? 2

11. (a) Write the structure of all possible products when 1:1 mixture of $PhOCH_2-CH=C^*H_2$ and $PhOCH_2-CH=CH_2$ is heated together. Explain their formation. ($C^* = C^{14}$). 2

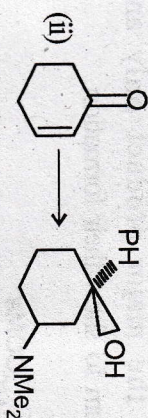
P.T.O.

(4)

- (b) Why do acetylenic protons resonate at upfield region with respect to ethylenic protons though acetylenic hydrogens are more acidic than ethylenic hydrogens? — Explain. 3
12. (a) Compare the rate of formation of aniline from fluorobenzene and bromobenzene in presence of NaNH_2 and liq. NH_3 . Cite suitable experimental evidence. 3
- (b) Which has a greater chemical shift for the OH proton, the ^1H NMR spectrum of pure ethanol or the ^1H NMR spectrum of ethanol dissolved in CH_2Cl_2 ? Give your answer with explanation. 2
13. (a) Explain with mechanism the rate(s) of nitration of nitrobenzene and pentadeuteronitrobenzene under similar reaction conditions. 2
- (b) How many peaks do you expect for nitrobenzene in its ^1H -NMR spectrum? Draw a rough sketch for the ^1H -NMR spectrum of nitrobenzene assigning the protons in the diagram. (Actual δ values and meta-coupling may be ignored). 3
14. (a) If two signals differ by 90 Hz in a 300 MHz spectrometer, by how much do they differ in a 500 MHz spectrometer? 1
- (b) Convert : 2+2



(5)

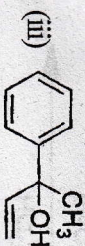
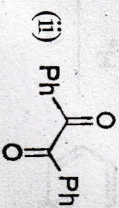
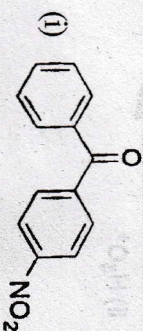


Group - C

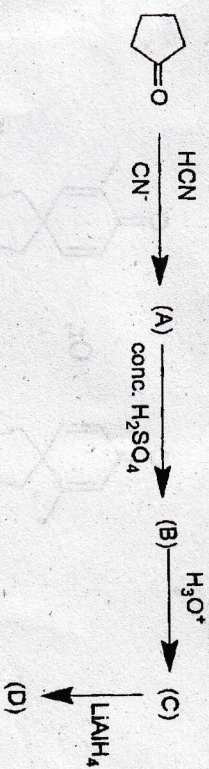
Answer any **one** question :

10×1=10

15. (a) Give the retrosynthetic pathways and one efficient synthetic method for the following compound. 3×2

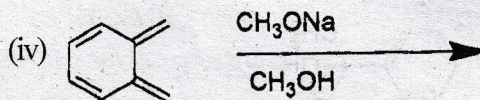
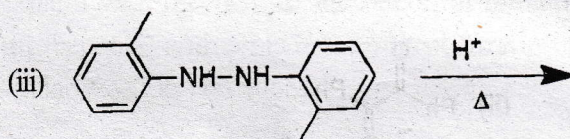
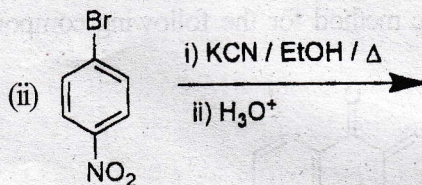
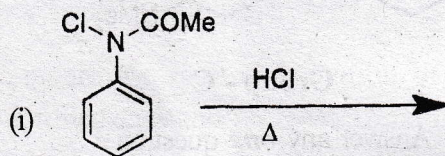


- (b) Write down the structure of the products A, B, C and D 4



P.T.O.

16. (a) Predict the major product only and write mechanism to show their formation. 2×4



- (b) Which member of the following pair will undergo Dienone-Phenol rearrangement more rapidly and why? 2

