U.G. 4th Semester Examination - 2021

CHEMISTRY

[HONOURS]

Course Code : CHEM-H-CC-T-10

(Organic Chemistry)

Full Marks : 20 Time : 1 Hour

The figures in the right-hand margin indicate marks.

Candidates are required to give their answers in their own words as far as practicable.

1. Answer any **five** questions: 1×5=5

   a) In Nef reaction nitronate salt is poured into strong acid (pH<1), why?

   b) How would you distinguish the axial and equatorial –OH group of cyclohexanol from IR spectral data?

   c) Carbonyl stretching frequency in 1-acetyl-cyclohexene slightly differs from that 1-acetyl-2-methylcyclohexene– Explain.

   d) Explain why ethanol is a good solvent for UV-measurement but not for IR.

   e) Which compound is used as internal standard for running ^{1}H-NMR spectra of water soluble compound in D_2O?

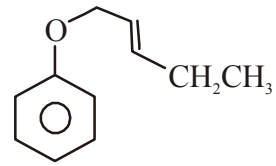
   f) Why the unit of chemical shift (δ) is dimensionless?

   g) Write the peak intensity ratio of a proton having quintet multiplicity.

   h) Why does the more substituted group migrate (compare to less substituted) in the Baeyer-Villiger reaction?

2. Answer any **one** question: 5×1=5

   a) i) Write down the product of the following reaction with proper mechanism:



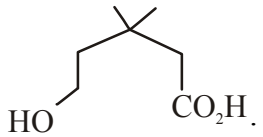
   3

   ii) What type of electronic transitions are possible for the following compounds?

   CH_2=CH–OCH_3 and

   CH_2=CH.$CH_2CH_2OCH_3$ 2

b) i) Suggest a synthesis for



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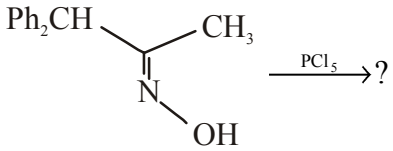
ii) Predict the product of the following reaction with suitable mechanism.



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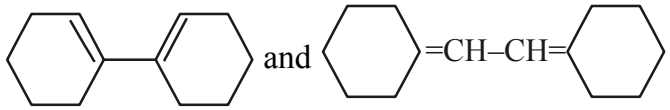
c) i) Compare the λ_{max} of I and II.



(I) (II) 2

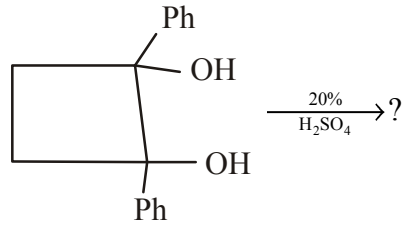
ii) Write the most plausible structure of C_4H_8O isomer with the following ^{1}H-NMR data. 2

S-value	No. of 'H'
1.84	4H(m)
3.73	4H(m)

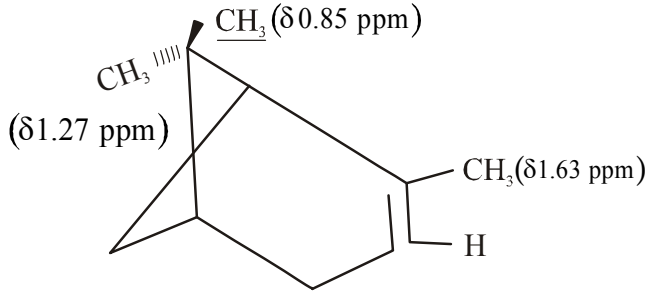
iii) Why are TMS protons usually in the upfield in NMR? 1

3. Answer any **one** question: 10×1=10

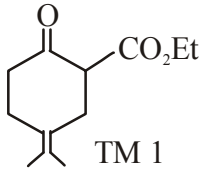
a) i) Write down the product of the following reaction with proper mechanism:



ii) Explain the lower δ (chemical shift) value of the marked methyl proton.



iii) Design a retrosynthesis of the following compound and suggest a forward synthesis of TM1:

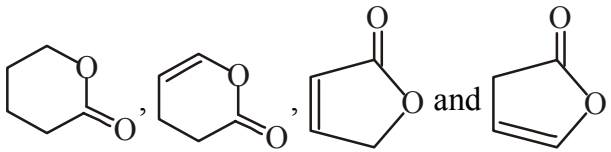


TM 1

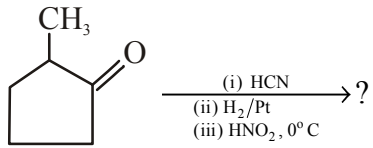
iv) Give an evidence in favour of antimigration with respect to leaving group in Beckmann rearrangement.

3+2+3+2=10

b) i) Arrange these molecules according to their increasing order of IR streching frequency with proper logic:



ii) Predict the product with suitable mechanism:

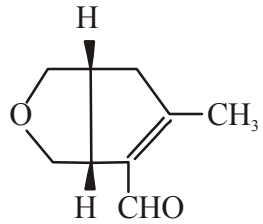


iii) A compound 'A' exhibit only one singlet in ^{1}H-NMR at $\delta_{2.17}$. When A is treated with PhCHO in presence of ethanolic NaOH form B. The IR spectrum of B displays band at 3025, 1665, 1630, 1600, 763 and 753 cm^{-1} and ^{1}H-NMR spectrum shows signals at

δ 7.82(d, 2H, J=18 Hz), 7.60(10H, m) and 7.05(2H, d, J=18 Hz).

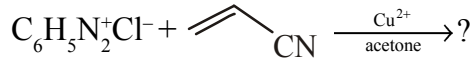
What are the structures of A and B?

iv) Design a retrosynthesis of the following molecules and suggest a forward synthesis of TM2:



2+2+3+3=10

c) i) Predict the product with proper mechanism:

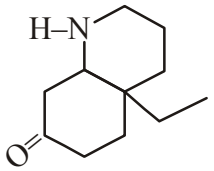


ii) A conjugated diene in hexane solution shows λ_{max} at 219 nm. What will happen if the solvent is changed to ethanol?

iii) In 1,2-migration reaction, the migrating group retain its stereochemistry– Explain the facts with orbital interactions.

iv) Tert-butyl fluoride in ^{1}H-NMR shows a doublet at δ 1.5 with J=20 Hz, while on adding SbF_5 it shows only a singlet at δ 4.6– explain.

v) Design a retrosynthesis of the following molecule:



2+2+2+2+2=10

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