M.Sc. Sem II Nov. 2017

S1112 / S0445 CHEMISTRY : PAPER III ORGANIC CHEMISTRY.

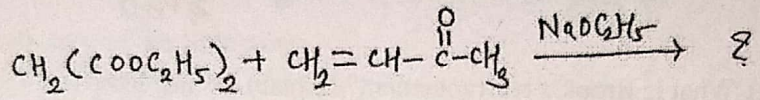
Q.P.Code:11090

(Time: 2½ Hours) **[Total Marks: 60]**

N.B : 1) **All** questions are compulsory.
2) **Figures** to the **right** indicate **full** marks.

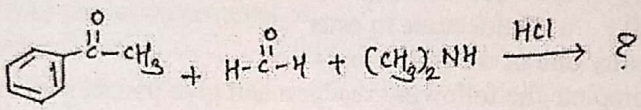
1. (A) Attempt **any two** of the following:-

(a) Complete the following reaction, name it and explain the mechanism: **4**

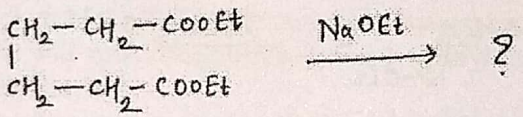


(b) Predict the product and name the following reactions: **4**

i)

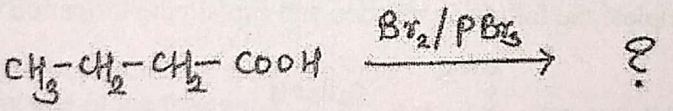


ii)



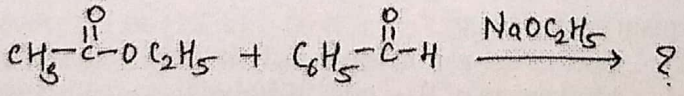
(c) What is haloform reaction? Explain the mechanism with a suitable example. **4**

(d) Complete the following reaction, name it and explain its mechanism: **4**

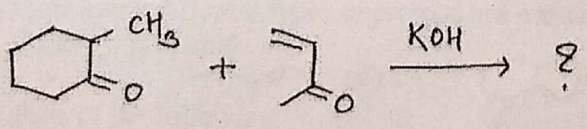


(B) Attempt **any one** of the following:

(a) Predict the product and give the mechanism of the following reaction: **4**

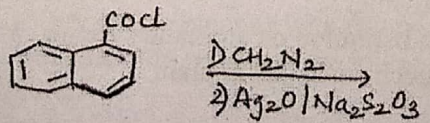


(b) Complete the following reaction and give the mechanism involved: **4**

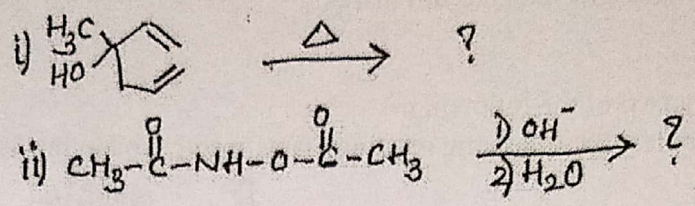


2. (A) Answer **any two** of the following:

(a) Complete the following reaction and explain its mechanism. **4**



(b) Complete the following reactions and name them: 4



(c) What is Brook's rearrangement? Explain its mechanism. 4

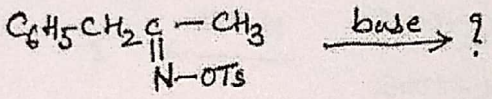
(d) Give the mechanism for the following conversions: 4

(i) 4, 5 - dinitrobenzoic acid to 4, 5 - dinitroaniline

(ii) α - haloketone to ester

(B) Answer **any one** of the following:-

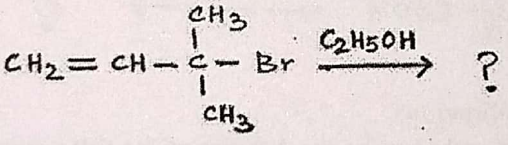
(a) Complete the following reaction and give its mechanism: 4



(b) What is olefin metathesis? Explain its mechanism. 4

3. (A) Answer **any two** of the following:

(a) Complete the following reaction and explain the formation of the products: 4

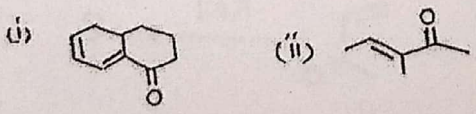


(b) Explain the following: 4

(i) Role of Ion-pair Effect in S_N1 reaction.

(ii) Mechanism of B_{Ac}^2 ester hydrolysis.

(c) Calculate the λ_{max} values for the following compounds: 4



(d) Explain the following: 4

(i) o - Nitroacetanilide is deeper yellow in colour than its para isomer.

(ii) Fundamental vibrations and overtones.

(B) Answer **any one** of the following:

(a) Why is nucleophilic substitution on aromatic systems difficult? Give an example of the S_{NAr} mechanism and explain. 4

(b) Answer the following: 4

(i) What happens to the IR absorption peak of ethanol when 10 cm^3 of CCl_4 is added to ethanol?

(ii) Which of the two molecules - butadiene or ethene, will have a greater λ_{max} value and why?

4. (A) Answer **any two** of the following:

(a) Write a note on: 4

(i) Chemical and magnetic equivalence

(ii) Vicinal coupling

(b) Give the fragmentation patterns of: 4

(i) Salicylic acid

(ii) t-Butyl alcohol

(c) Answer the following: 4

(i) Explain McLafferty rearrangement in mass spectrometry.

(ii) How will you distinguish between 3-methyl and 4-methyl cyclohexene?

(d) An organic compound A (molecular formula $C_6H_{12}O_2$) showed the following IR and ^1H NMR spectral data: 4

IR(neat) υ_{max}: 2950, 2850, 1730, 1480, 1460, 1400 cm^{-1}

^1H NMR δ ppm: 1.20 (9H, s)
3.70 (3H, s)

Assign the structure to the compound.

(B) Answer **any one** of the following:

(a) An organic compound, molecular formula $C_9H_{10}O_2$, exhibits the following spectral data: 4

IR:1745 cm^{-1}(s), 1225 cm^{-1}(br, s), 749(s); 679 cm^{-1} (s)

^1H NMR: δ 1.96 (3H, s); 5.00 (2H, s); 7.22 (5H, m)

Deduce the structure of the compound.

(b) Answer the following:- 4

(i) How will you distinguish between cis and trans alkene?

(ii) How many different types of protons are present in 2-methyl propene?

5. Attempt **any four** of the following: 12

(A) Explain, giving reasons, which enolate is formed when 2-heptanone is treated with -

(i) LDA, THF, -78^0C

(ii) $NaOCH_3/CH_3OH$, 25^0C

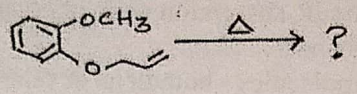
(B) Explain the stability of enolate ions with suitable examples.

(C) Give complete equations to represent the following rearrangements:

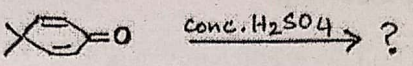
(i) von Richter

(ii) Demjanov

(D) Complete the following reactions:

(i) 

(ii) $CH_3O-CH_2Ph \xrightarrow{PhLi} ?$

(iii) 

(E) Explain:-
- (i) Tele substitution
- (ii) Nucleophilicity

(F) Discuss the effect of steric hindrance on coplanarity in UV spectroscopy.

(G) Explain the following in Mass spectrometry:
- (i) Isotopic abundance
- (ii) Molecular ion
- (iii) Base peak

(H) What is chemical shift? What are the factors affecting chemical shift? Explain any one.