

T.Y.B.SC. SEM – VI (2014 COURSE) : SUMMER - 2018

SUBJECT: CHEMISTRY: ORGANIC CHEMISTRY – VI

Day : Monday
Date : 16/04/2018

S-2018-0775

Time : 12.00 NOON TO 02.00 PM
Max. Marks : 40

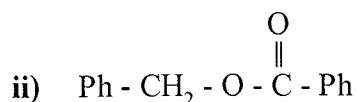
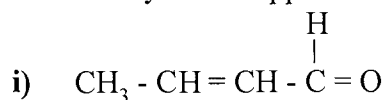
N.B.

- 1) All questions are **COMPULSORY**.
- 2) Figures to the right indicate **FULL** marks.
- 3) Answers to both the sections should be written in the **SAME** answer book.

SECTION – I

Q.1 Attempt any **TWO** of the following: **(10)**

a) Give retrosynthetic approach for the following compounds:



b) What is Aldol condensation? Discuss its mechanism.

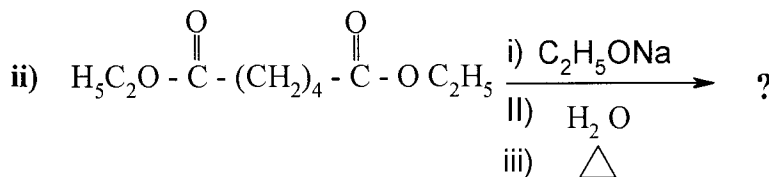
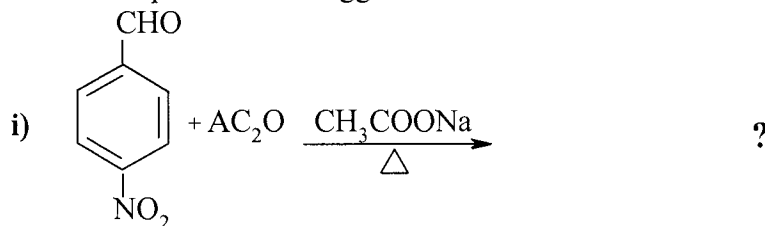
c) Write a note on : Wittig reaction.

Q.2 Attempt any **TWO** of the following: **(10)**

a) Define the following terms with one example of each.

- i) Disconnection
- ii) Synthons
- iii) Target molecule

b) Predict the product and suggest the mechanism.



c) Write a note on : Claisen-ester condensation.

P.T.O.

SECTION – II

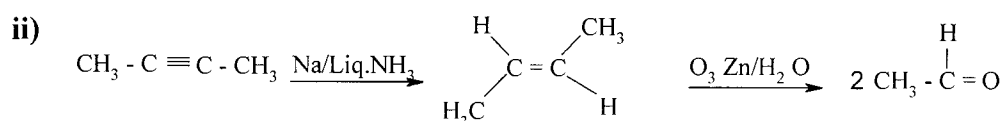
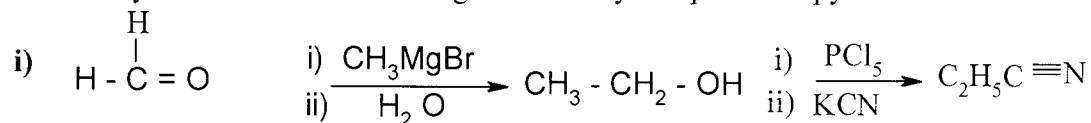
Q.3 Attempt any **TWO** of the following: **(10)**

a) Explain the following:

i) Ethanol can be used as a solvent in UV but acetone can't be used.

ii) Aniline shows hypsochromic shift in presence of acid.

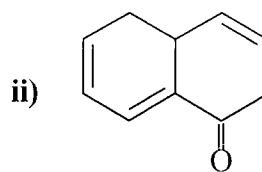
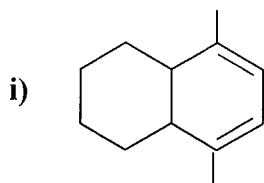
b) How will you monitor the following reactions by IR spectroscopy?



c) Write a note on : Spin-Spin splitting.

Q.4 Attempt any **TWO** of the following: **(10)**

a) Calculate λ_{max} for the following:



b) Assign structure of the compound using following spectral data:

MF : $\text{C}_8 \text{H}_7\text{N}$

IR : 2220, 1620 & 1510 cm^{-1}

PMR : i) 2.4 δ (s, 3H)

ii) 7.2 δ (d, J = 8 Hz, 2H)

iii) 7.5 δ (d, J = 8Hz, 2H)

c) Assign structure of the compound using following spectral data:

MF : $\text{C}_4 \text{H}_8\text{O}$

IR 1715 cm^{-1}

PMR : i) 1.05 δ (t, J = 6Hz, 15mm)

ii) 2.05 δ (s, 15 mm)

iii) 2.40 δ (q, J = 6Hz, 10 mm)

* * *

TABLE : 1

Characteristic Infrared Absorptions of Functional Groups

Group	Frequency Range cm^{-1}	Intensity
A. Alkyl		
C-H (stretching)	2853 – 2962	(m-s)
Isopropyl – CH (CH ₃) ₂	1380 – 1385	(s)
	and 1365 – 1370	(s)
	1385 – 1395	(m)
tert-Butyl – C (CH ₃) ₃	and – 1365	(s)
B. Alkenyl		
C-H (stretching)	3010 – 3095	(m)
C=C (stretching)	1620 – 1680	(v)
R-CH=CH ₂	985 – 1000	(s)
	and 905 – 920	(s)
R ₂ C=CH ₂ (out-of-plane	880 – 900	(s)
cis-RCH=CHR C-H bendings)	675 – 730	(s)
trans-RCH=CHR	960 – 965	(s)
C. Alkynyl		
\equiv C-H (stretching)	3300	(s)
C = C (stretching)	2100 – 2260	(v)
C \equiv N (stretching)	2210 – 2260	(v)
D. Aromatic		
Ar-H (stretching)	3030	(v)
Aromatic substitution type (C-H out-of-plane bendings)		
Monoasubstituted	690 – 710	(very s)
	and 730 – 770	(very s)
o-Disubstituted	735 – 770	(s)
m-Disubstituted	680 – 725	(s)
	and 750 – 810	(very s)
p-Disubstituted	800 – 840	(very s)
E. Alcohols, Phenols, Carboxylic Acids		
OH (alcohols, phenols, dilute solns)	3590 – 3650	(sharp v)
OH (alcohols, phenols, hydrogen bonded)	3200 – 3550	(broad, s)
OH (carboxylic acids, hydrogen bonded)	2500 – 3000	(broad, v)
F. Aldehydes, Ketones, Esters and Carboxylic Acids		
C = O stretch	1630 – 1780	(s)
Aldehydes	1690 – 1740	(s)
Ketones	1680 – 1750	(s)
Esters	1735 – 1750	(s)
Carboxylic acids	1710 – 1780	(s)
Amides	1630 – 1690	(s)
G. Amies	3300 – 3500	(m)
N – H		
H. Nitriles	2220 – 2260	(m)
C \equiv N		

TABLE : 2

Approximate Proton Chemical Shifts in N M R

Type of Proton	Chemical Shift, Delta, PPM (δ)
1° Alkyl, RCH ₃	0.8 – 1.0
2° Alkyl, RCH ₂ R	1.2 – 1.4
3° Alkyl R ₂ CH	1.4 – 1.7
Alkyl, R ₂ C = C – CH ₃ R	1.6 – 1.9
Benzylic, ArCH ₃	2.2 – 2.5
Alkyl chloride, RCH ₂ Cl	3.6 – 3.8
Alkyl bromide, RCH ₂ Br	3.4 – 3.6
Alkyl iodide, RCH ₂ I	3.1 – 3.3
Ether, ROCH ₂ R	3.3 – 3.9
Alcohol, HOCH ₂ R	3.3 – 4.0
Ketone, RCCH ₃ O	2.1 – 2.6
Aldehyde, RCH O O	9.5 – 9.6
Vinylic, R ₂ C = CH ₂	4.6 – 5.0
Vinylic, R ₂ C = CH R	5.2 – 5.7
Aromatic, ArH	6.0 – 9.5
Acetylenic, RC \equiv CH	2.5 – 3.1
Alcohol hydroxyl, ROH	0.5 – 6.0 ^a
Carboxylic, RCOH O	10 – 13 ^a
Phenolic, ArOH	4.5 – 7.7 ^a
Amino R – NH ₂	1.0 – 5.0

^a The chemical shifts of these groups vary in different solvents and with temperature and concentration.

TABLE : 3

U. V. Absorption rules for diene chromophores		U.V. Absorption rules for Enone System	
1) Parent	215 nm	1) Parent	215 nm
2) Each extra conjugation	30 nm	2) Each extra conjugation	30 nm
3) Homoannular	39 nm	3) Homoannular	39 nm
4) Exocyclic double bond	05 nm	4) Substituents	
5) Each alkyl (R) substituent directly attached to double bounded carbon	05 nm	a) Alkyl group at α	10 nm
		b) Alkyl group at β	12 nm
		c) Alkyl group at γ, δ	18 nm