

M. SC. (ANALYTICAL CHEMISTRY) / M. SC. (ORGANIC CHEMISTRY) / M. SC. (INORGANIC CHEMISTRY) SEM-II
(CHOICE BASED CREDIT & GRADE SYSTEM) : SUMMER -

2018

SUBJECT: ORGANIC CHEMISTRY – II

Day : Tuesday
Date : 17/04/2018

S-2018-0872

Time : 03.00 PM TO 06.00 PM
Max. Marks: 60

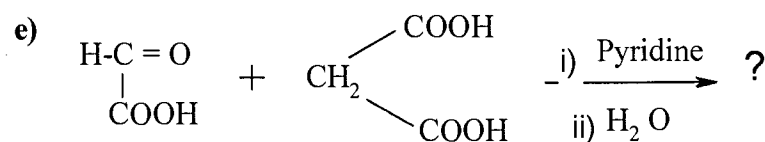
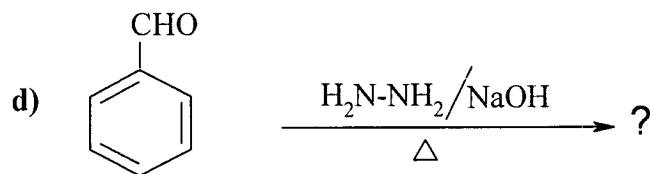
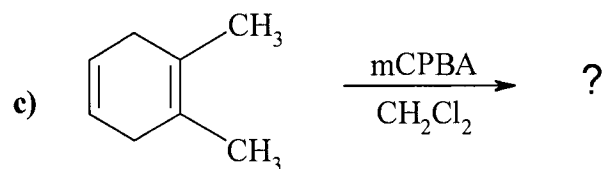
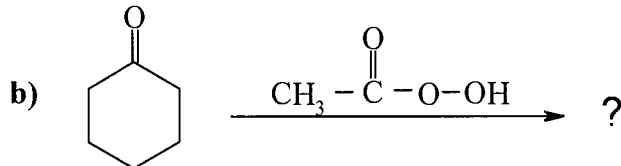
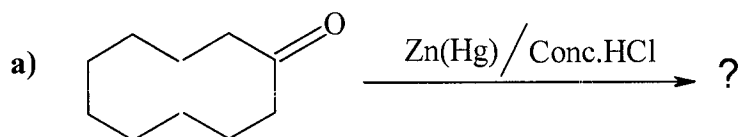
N.B.

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

Q.1 Attempt any **THREE** of the following: (15)

- a) Discuss the mechanism and applications of Dieckmann condensation.
- b) What are sulphur ylides? How are they prepared? Discuss their applications.
- c) Discuss the preparation and applications of organo-zinc compounds.
- d) Discuss reduction of carbonyl compounds by LiAlH_4 and NaBH_4 .
- e) Write a note on : Dakin reaction.

Q.2 Predict the product/s in any **THREE** of the following reactions by giving (15)
mechanism. Justify your answer.

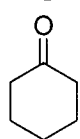


P.T.O.

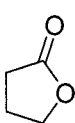
SECTION – II

Q.3 Attempt any **THREE** of the following: **(15)**

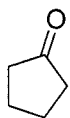
a) Explain IR absorption frequencies for the following:



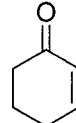
1710 cm^{-1}



1760 cm^{-1}



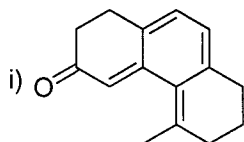
1740 cm^{-1}



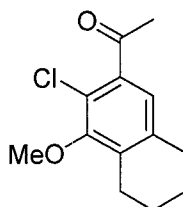
1695 cm^{-1}

b) Explain α -haloketo rule with suitable example.

c) Calculate λ_{max} of the following:

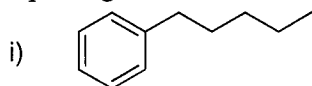


ii)

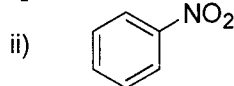


d) Explain with suitable examples. Factors affecting on IR frequencies.

e) Explain genesis of the following compounds.



$m/e = 148, 92, 77, 51$



$m/e = 93, 77, 65, 51$

Q.4 Assign the structure to any **THREE** of the following: **(15)**

a) MF : $\text{C}_9\text{H}_{10}\text{O}_2$
 IR : 1738, 1600, 1500 cm^{-1}
 PMR : δ 1.3 (3H, t)
 2.9 (2H, q)
 7.25 (5H, m)

b) MF : $\text{C}_{10}\text{H}_{10}\text{O}_2$
 UV : λ_{max} 260 nm (ϵ 13000)
 IR : 1710, 1630, 1590, 960, 710 cm^{-1}
 PMR : δ 3.8 (3H, s)
 5.65 (1H, d, $J = 14$ Hz)
 6.60 (1H, d, $J = 14$ Hz)
 7.35 (2H, t, $J = 8$ Hz)
 7.50 (1H, m)
 7.70 (2H, dd, $J = 2$ Hz & 8 Hz)

c) MF : $C_5H_{10}O_3$
UV : Not significant
IR : 1730 cm^{-1}
PMR : δ 2.1 (3H, s)
 3.35 (6H, s)
 4.60 (1H, s)

d) MF : C_5H_6O
UV : Not significant
IR : $1600, 1500\text{ cm}^{-1}$
PMR : δ 2.3 (3H, s)
 5.85 (1H, d, $J = 2\text{Hz}$)
 6.20 (1H, dd, $J = 1.5\text{ Hz} \& 2.00\text{ Hz}$)
 7.20 (1 H, d, $J = 1.5\text{ Hz}$)

e) MW = 74
m/e = 59, 56
IR = 3500 cm^{-1}
PMR = δ 1.3 (9H, s)
 2.8 (1H, s, D_2O , Exchangeable)

* * *

Table 1 :

Some characteristic IR data in cm^{-1} . Only approximate values are listed.

$\equiv \text{C-H}$ 3300,	$= \text{C-H}$ 3050
$\text{O}=\text{C}-\text{H}$ 2800,	N-H 3300
$\text{O}-\text{H}$ 3600 (free),	$\text{C}\equiv\text{N}$ 2250
$\text{C}\equiv\text{C}$ 2200,	$\text{C}=\text{C}$ 1620 – 1680
Aromatic ($\text{C}=\text{C}$) 1600 to 1500,	$-\text{C}=\text{N}$ 1660
Saturated ketone 1720,	Saturated ester 1750
Saturated acids 1720,	Saturated aldehydes 1730,
Saturated amides 1650	$\text{CH}=\text{CH}_2$ 900 and 910
$\text{CH}=\text{CH}$ (trans) 960,	$\text{CH}=\text{CH}-$ (cis) 690
$\text{C}=\text{CH}_2$ 890	$\text{C}=\text{CH}$ 790 – 840
NO_2 1530 and 1050	

Bands for aromatic compounds depends on the number of adjacent free aromatic hydrogens :

5 free – 690 – 710 and 730 – 770	
1 free 850 – 900,	4 free 735 – 770
3 free 750 – 810	2 free 770, 800 – 860

Table 2 :

Approximate chemical shifts on methyl, methylene and methine protons, in δ values TMS as internal reference.

$\text{C}-\text{CH}_3$ 0.9,	$\text{O}-\text{C}-\text{CH}_3$ 1.4
$\text{C}=\text{C}-\text{CH}_3$ 1.6,	$\text{Ar}-\text{CH}_3$ 2.3,
$\text{O}=\text{C}-\text{CH}_3$ 2.2,	$\text{N}-\text{CH}_3$ 2.3,
$\text{S}-\text{CH}_3$ 2.1,	$\text{O}-\text{CH}_3$ 3.3
C-H in cyclopropane 0.7,	$\text{C}=\text{CH}_2$ exocyclic 4.6,
$\text{C}=\text{CH}_2$ open chain 5.3	$\text{C}-\text{CH}$ 5.1
$\text{C}\equiv\text{CH}$ cyclic 5.3,	$\text{Ar}-\text{H}$ 7 to 9