



University of Tanta  
Faculty of Pharmacy  
Dept. of Pharm. Chemistry  
Organic Chemistry



Final Exam  
Second Semester, Pre-Pharmacy Year  
Time allowed: 120 min - Date: 26 - 5 - 2015

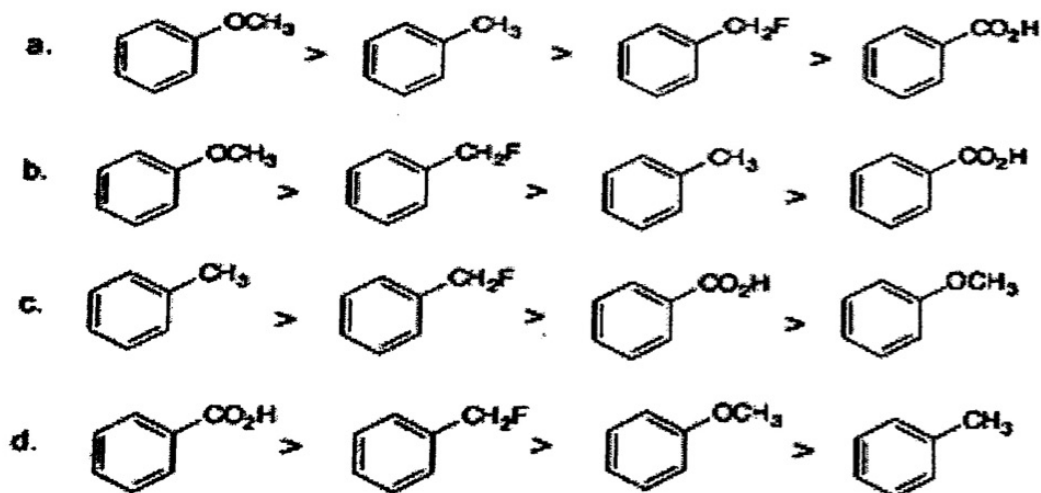
This Exam Booklet contains (.16.) different pages  
(250 Points for all)

PART ONE (75 Points)

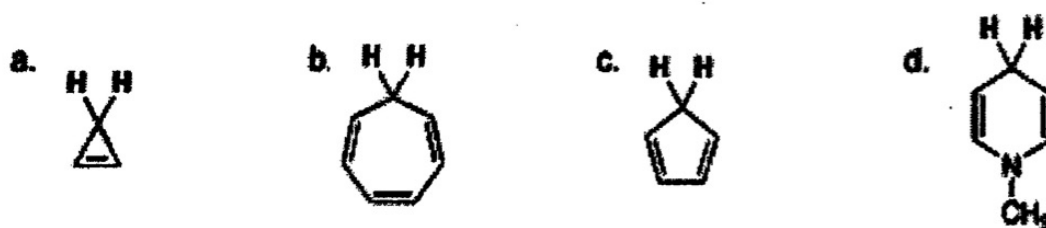
Q # I

(The questions No.1, 2 and 3 three points each and the question No. 4- is 5 points)

1-Which is the correct order of reactivity (most reactive to least reactive toward electrophilic aromatic substitution)?

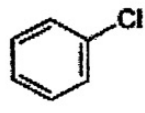


2-Consider the highlight proton. Which compound is predicted to have the lowest pKa (higher acidity)?

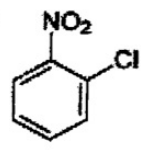


3-Which of the following is compatible with a Friedel-Craft reaction?

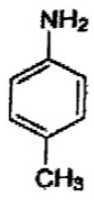
a.



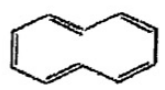
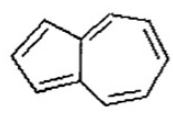
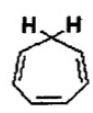
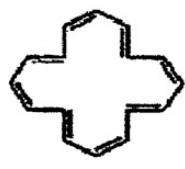
b.



c.



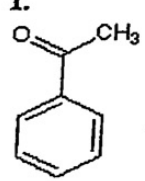
4-Describe the following as aromatic non-aromatic. Assume each is planar.



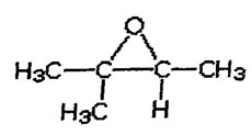
## Q # II

Complete the following equations: ( 4 points each)

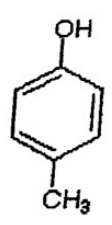
1.



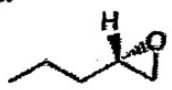
2.



3.



4.

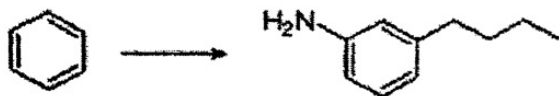




**Q # IV**

- Convert the following: (21 Points)

1-



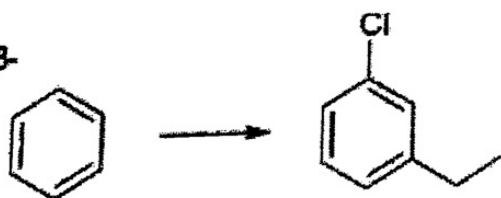
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Part II (75 Points, by K. Elberembally, Ph.D)

Q.1

Propose a structure that is consistent with the following set of  $^1\text{H}$  NMR data. IR data is provided for the same compound. Assign the chemical shifts and splitting patterns to specific aspects of the structure you propose.

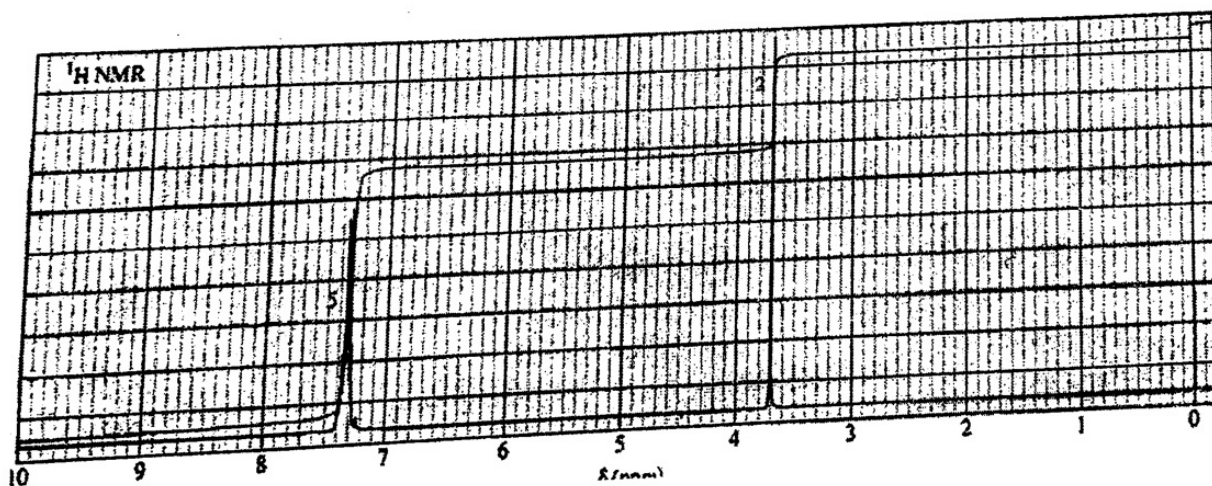
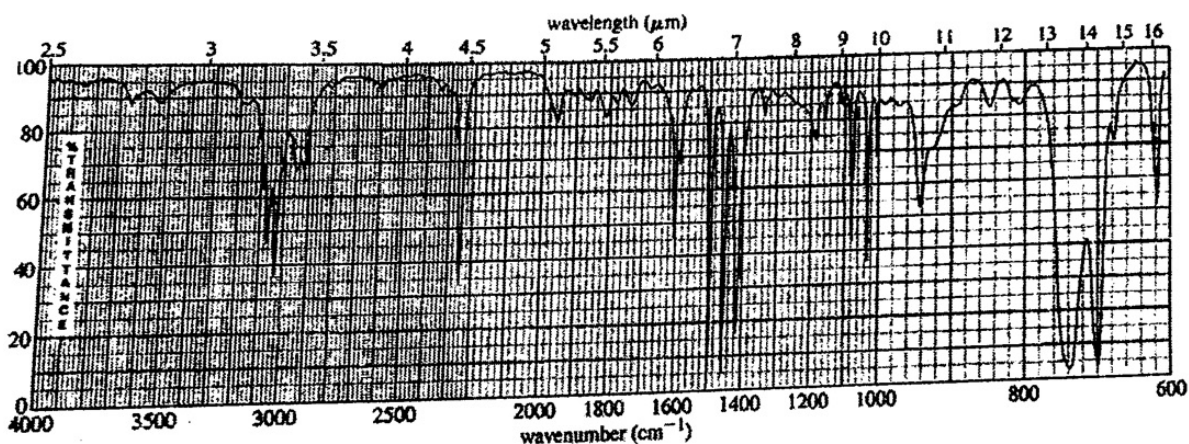
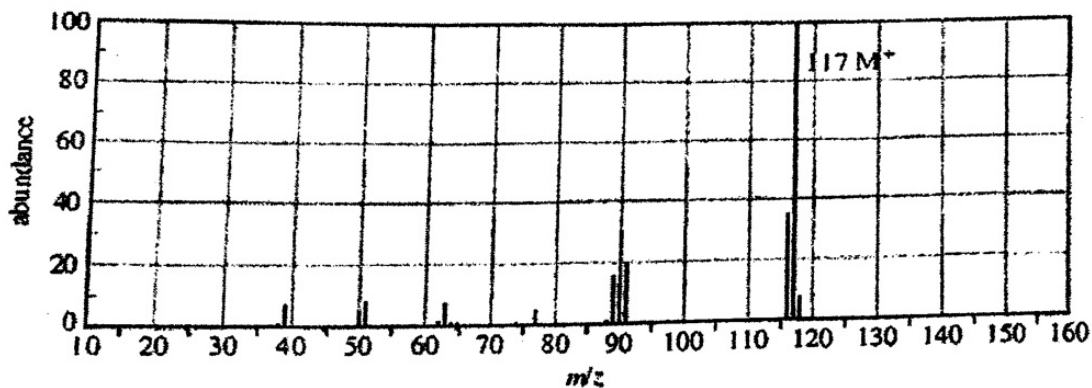
MF:  $\text{C}_4\text{H}_7\text{BrO}_2$

$\delta$ (ppm)	Splitting	Integration	IR
1.08	t	3H	2500-3500 $\text{cm}^{-1}$ (broad), 1715 $\text{cm}^{-1}$ (strong)
2.07	m	2H	
4.23	t	1H	
10.97	s	1H	

Q.2

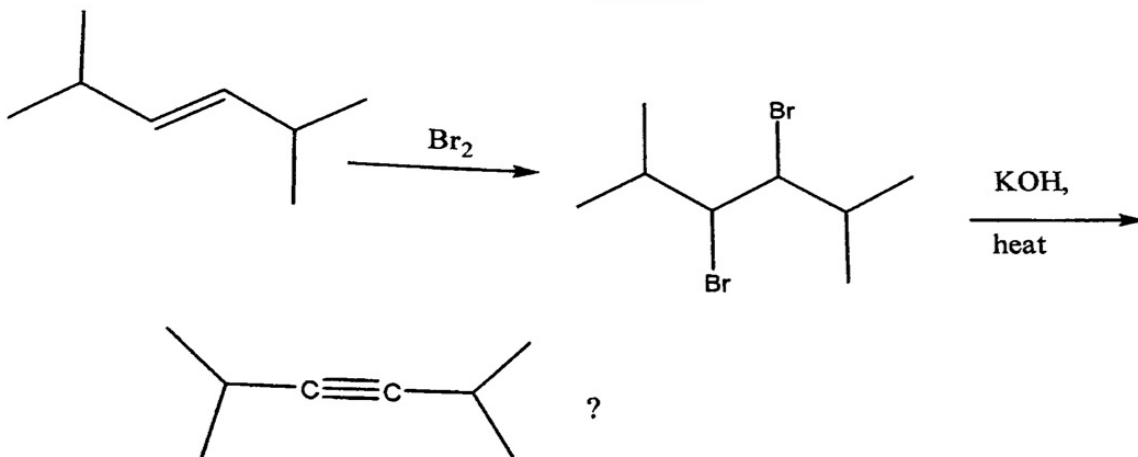
A compound was isolated as a minor constituent in an extract from garden cress. Its spectra are shown here.

- Propose a structure for this compound.
- Verify that your proposed structure accounts for the major features of each spectrum.
- How can you account for the base peak at  $M^+$  ( $m/z = 117$ ), and the strong peaks at  $m/z = 116, 91$ .

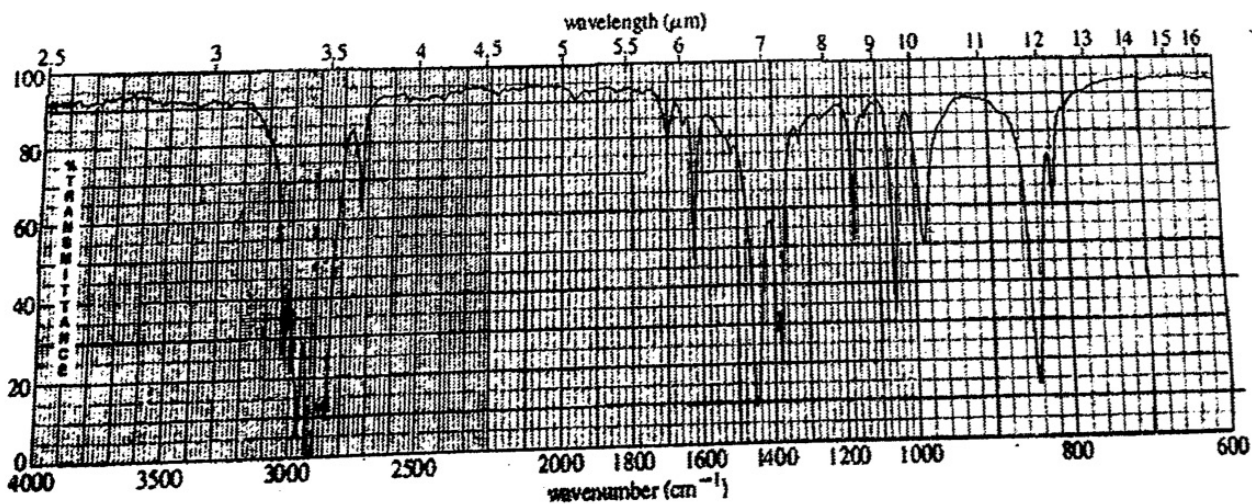
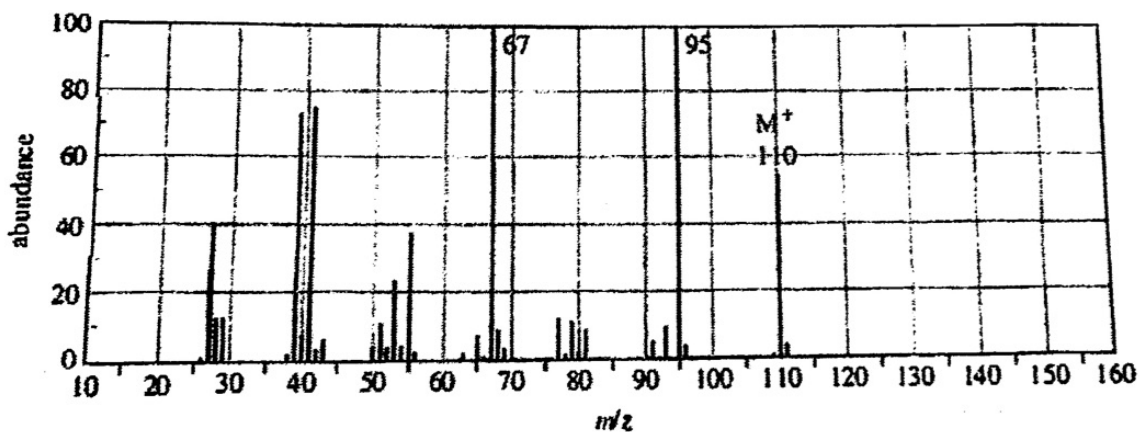


Q.3

You have studied a synthesis of alkynes by a double dehydrohalogenation of dihalides. A student tried to convert trans-2,5-dimethyl-3-hexene to 2,5-dimethyl-3-hexyne via the following reactions. The infrared and mass spectra of the major product are shown here.

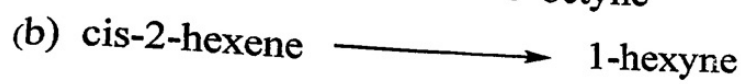
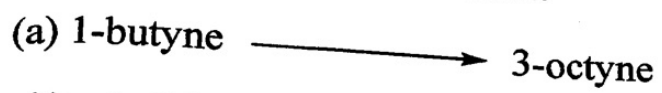


- Do the spectra confirm the right product? If not, what is it?
- Explain the important peaks in the IR spectrum.



Q.4

Show how you would accomplish the following synthetic transformations. Show all intermediates.





**Part III (100 Marks)**

Answer the following questions in (48) min in the provided spaces and do not use pencil.

- 1) Draw the chemical structure for each of the following compounds? (6 Marks, 2 min)
- a) (*E*)-2-chloro-2-butene
  - b) 2-Naphthalenecarbaldehyde

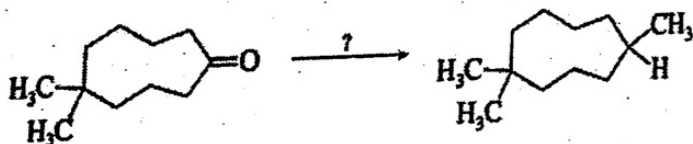
c) Ethyl isopropyl ketone

2) Show how you could accomplish the following conversion: (18 marks, 10 min)

a) Cyclohexene to 1,3-cyclohexadiene

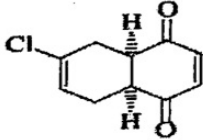

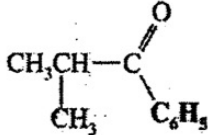
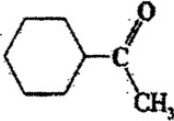
b) Ethanol to formaldehyde

c)



3) Complete the following table as indicated in each case only in the provided space?

(30 marks, 15 min)

Reactants	Reagents	Products
$\text{CH}_3\text{CH}=\text{CH}\overset{\text{O}}{\parallel}\text{CCH}_3$	$\text{CH}_3\text{MgBr}$	<p>.....</p> <p>(major)</p> <p>+</p> <p>.....</p> <p>(minor)</p>
<p>.....</p>	<p>Diels-Alder reaction</p>	
	$\text{CHCl}_3$ + $\text{KOH}$	<p>.....</p>
$\begin{array}{c} \text{CH}_3 \\   \\ \text{H}_2\text{C}=\text{C}-\text{C}=\text{CH}_2 \\   \\ \text{CH}_3 \end{array}$	$\text{Br}_2$	<p>.....</p> <p>+</p> <p>.....</p>
$\begin{array}{c} \text{CH}_3\text{CH}-\text{C}\equiv\text{N} \\   \\ \text{CH}_3 \end{array}$	<p>1) .....</p> <p>2) .....</p>	
<p>.....</p>	$(\text{CH}_3)_2\text{CuLi}$	

4) Complete and write the mechanism of the following reactions? (22 marks, 10 min)

a)



b)



c)

