Al Azhar university *Instrumental Analysis*

Faculty of Pharmacy *Time allotted :- 2 hrs.*

Pharmaceutical Chem. Dept.

Trial Final Exam

Student's Name .....

Student's No .....

Q1] MCQ

1		7		13	
2		8		14	
3		9			
4		10	.		
5		11			
6		12			

Q2] True and False

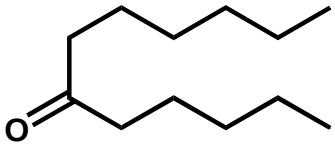
1		4		7		10	
2		5		8			
3		6		9			

Q1] In each of the following ; choose the most correct answer

1. **The odd term of the following is**
   a. Bathochromic
   b. hypsochromic
   c. HOMO
   d. IR

2. **Mass spectrometers are used to determine which of the following?**
   a. composition in sample
   b. Concentration of elements in sample.
   c. Hybrizdization
   d. None of the above

3. **How many absorption bands will appear in the C-NMR spectrum for the following compound?**
   a. 4
   b. 6
   c. 8
   d. None of the above



4. **The best method to distinguish between butane and 2-methylpropane**
   a. UV
   b. IR
   c. H-NMR
   d. None of the above

5. **Which of the following compounds has the least deshielded protons?**
   a. CH_3Cl
   b. CH_4
   c. CH_3OH
   d. CH_3OCH_3

6. **In mass spectrometer, the sample that has to be analysed is bombarded to be**
   a. ionized
   b. vaporized
   c. detected
   d. all the above

7. **When a high energy electron impacts molecule M in the ionization chamber, what type of species is initially produced?**
   a. Cation
   b. Radical
   c. radical cation
   d. radical anion

8. **The procedure for MS starts with which of the following processes?**
   a. The sample is bombarded by electron beam
   b. The ions are separated by passing them into electric and magnetic field
   c. The sample is converted into gaseous state
   d. The ions are detected

9. **Which of the following statements is wrong?**
   a. UV deals only forbidden and allowed transitions.
   b. Mass spectra provide information about valence electrons.
   c. IR absorption provides knowledge about Functional groups
   d. All the above are incorrect

10. **Which method would be best for finding the identity of an unknownorganic compound?**
    a. UV
    b. Its MS spectrum
    c. depends on the substance feature
    d. Running nmr analysi

11. The advantages of Chemical Ionization are:-

a. unstable molecules are kept away from fragmentation

b. cheap

c. complete evacuating leads to the appearance of sort of overlapping peaks.

d. None of the above.

12. A substance with (λmax = 645 nm). What color of light does the substance absorb?

a. Red

b. Blue

c. Green

d. None of the above

13. The molecule $OHCCH_2CH_2COOH$ will have an nmr spectrum consisting of...

a. two singlets and two triplets

b. singlet and doublet

c. one triplet and one singlet

d. none of the above

14. What does the notation $\pi^* \leftarrow n$ mean?

a. Transition from a π^* MO to a non-bonding MO

b. Transition from a π MOto π^* MO

c. Transition from a non quantum level n to π^* MO.

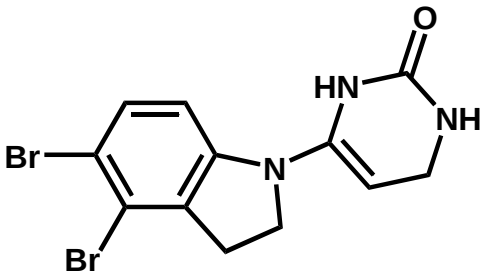
d. Transition from a non-bonding MO to π^* MO.

Q2] TRUE AND FALSE (T or F)

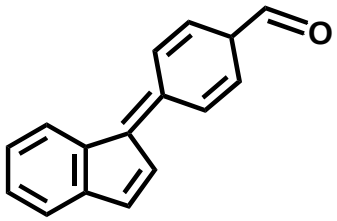
1. ( ) Hydrogen bonding causes red-shift effect in the value of $n \rightarrow \pi^*$ λmax.
2. ( ) In H-NMR; $B_{effective} = B_{applied} - B_{local}$
3. ( ) Ions in spectrometer is more sluggish in detection in the mass spectrometer
4. ( ) In mass spectroscopy; cationic fragments are detected, they are invisible.
5. ( ) λ max is the maximum absorption that occurred in the ir spectroscopy
6. ( ) Knocking out a group of electrons is the first step in mass spec analysis.
7. ( ) The condition for 13C-NMR needs high concentration of unknown sample.
8. ( ) IR spectra show up as multiple bands due to the interference of electronic, rotational and vibrational motions.
9. ( ) Even nitrogen atoms means; an even molecular mass according to Stevenson's rule
10. ( ) IR can be used for analysis of solid samples only

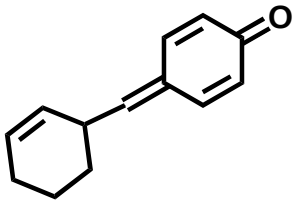
Q3]

a. By Inspection and calculation; provide the Degree of Unsaturation "DoU" for the following compound



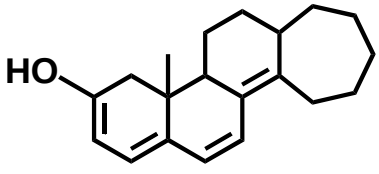
b. Discuss the UV analysis for the following two compounds



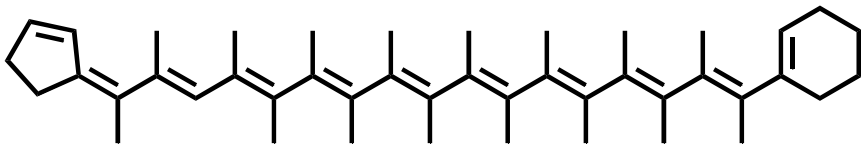


Q4]

a. Using Woodward-Fieser rule to Calculate λmax for the following compound and to indicate its color



b. Use Fieser- Cuhn rule to Calculate λmax for the following compound and its color



Q5]

a. Explain Mclafferty rearrangement using drawing and bond cleavage as convenient as possible as you can

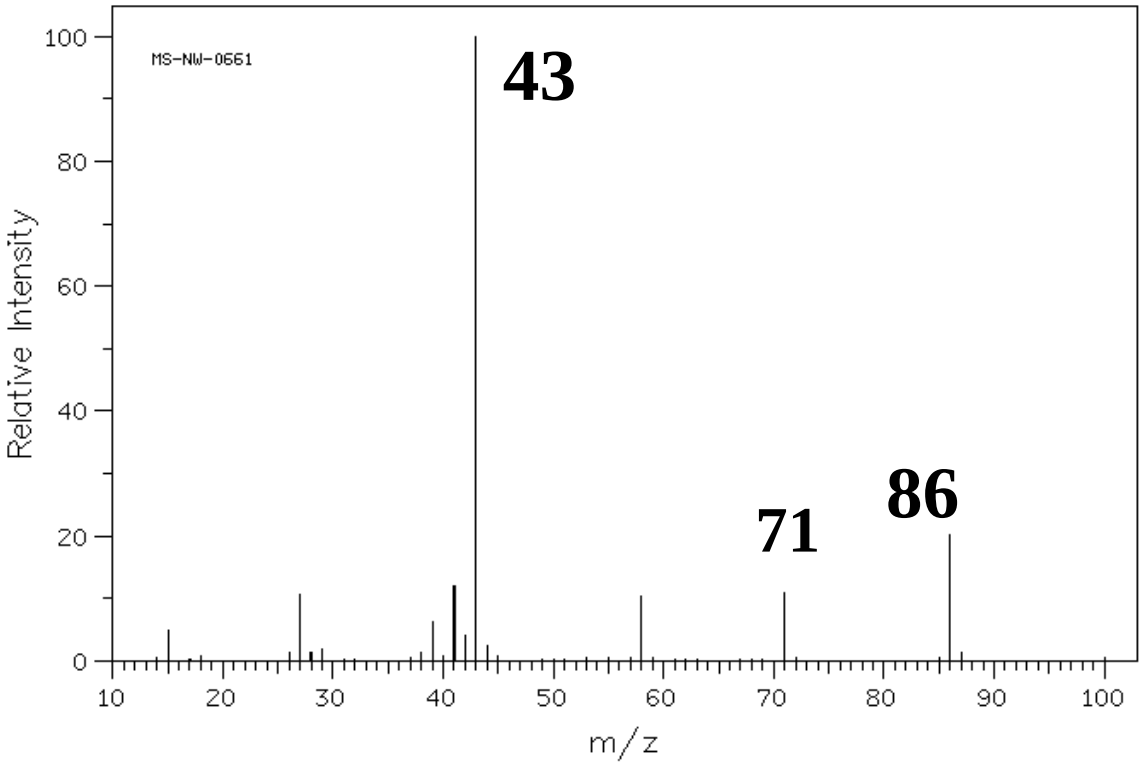
b. What is tropylium cation explain its structure, formation and its fate

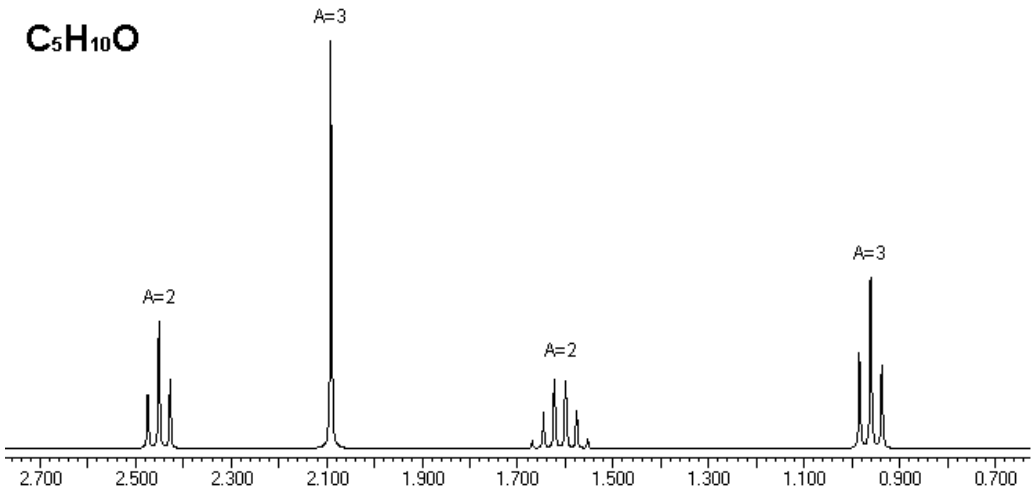
Q6]

a. Discuss the effect of changing the PH on λ max for phenoxide and aniline

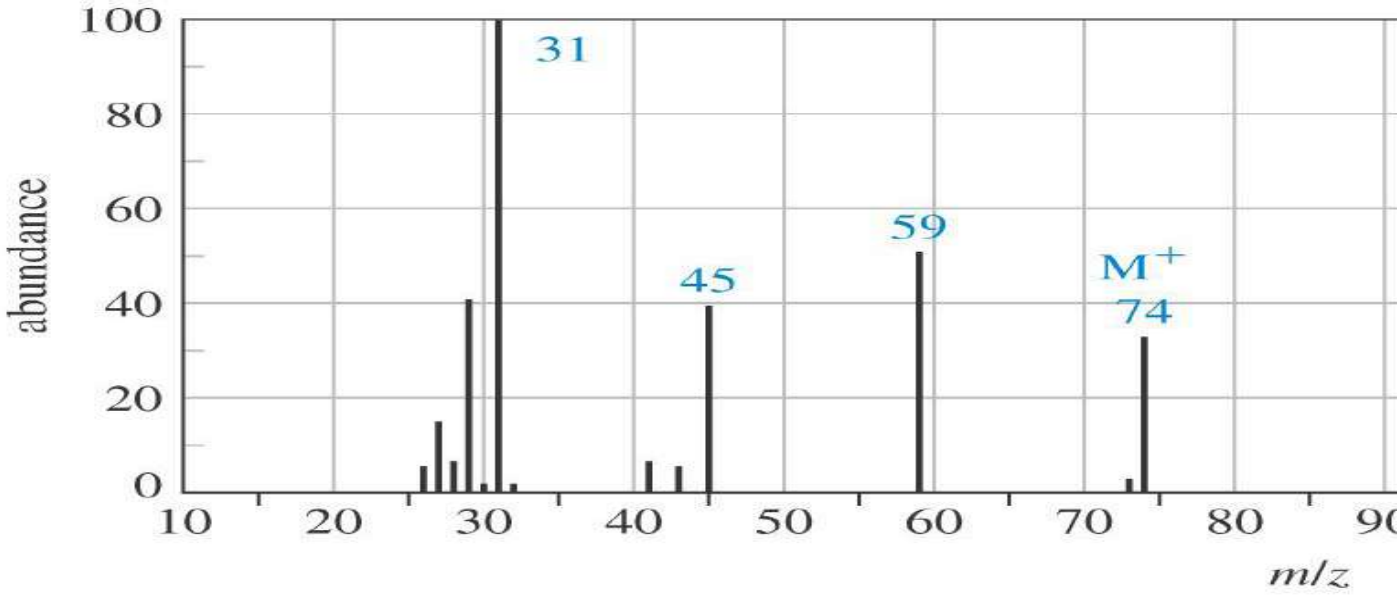
b. Discuss the effect of intra and inter molecular Hydrogen bonding on IR.

Q7] Using the below spectral data to identify the structure of the formula ($C_5H_{10}O$)



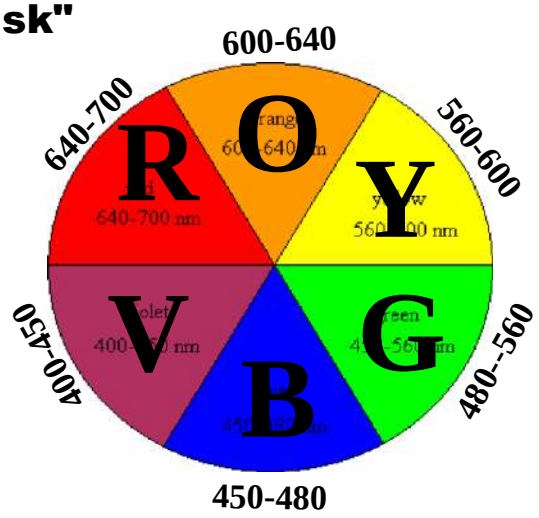


Q8] The following MS spectrum is related to diethylether. Explain the given fragments.



Data might be useful in solving your problems

1- Color wheel "Disk"



2- Woodward-Fieser Rule

	s-trans	homoannular (cisoid)	heteroannular (transoid)
base values:	217 nm	253 nm	214 nm

Increments:

For each additional conjugated double bond		+ 30 nm
For each exocyclic double bond		+ 5 nm
For each alkyl group		+ 5 nm
For each of the following groups:		
	- OR	+ 6 nm
	- O(C=O)R	+ 0 nm
	- Cl	+ 5 nm
	- Br	+ 5 nm
	- SR	+ 30 nm
	- NR_2	+ 60 nm
	- Ph	+ 60 nm

solvent