الإجابة النموذجية لامتحان كيمياء عضوية طيفية

٣١٧ ك
(ورقة امتحانيه كاملة)

المستوى : الثالث
الشعبة: ميكروبيولوجي وكيمياء
التاريخ : السبت ٢٠١٧/١/١٤
الممتحن : أ.د علي عبدالمعبود علي
قسم : الكيمياء
كلية : العلوم

Benha University **Total time: 2 hours**
Faculty of Science **14/1/2017**
Chemistry Department **3rd Level students**

Organic Spectroscopy [317 Ch] **Micro & Chem only**

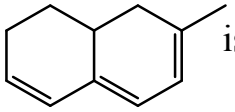
الامتحان في ثلاث ورقات

Answer on the following:

[I] Choose the correct answer: [30 marks]

1) Propene has …….. types of electrons
a- n b- σ c- π d- both b & c

2) 2-Hydroxybenzoic acid has …… types of electrons
a- π b- n c- σ d- all of these

3) λ_{max} for compound  is …… nm

a- 311 b- 330 c- 340 d- 290

4) Heteroannular diene has λ_{max} equal to …… nm
a- 200 b- 190 c- 217 d- 260

5) Trans-stilbene has double bond frequency in IR at about …….. cm^{-1}
a- 1580 b- 1550 c- 1600 d- none of these

6) Wave number of cyclopropanone is …….. cycloheptanone
a- larger than b- smaller than c- equal to d- none of these

7) Stretching vibrations occur at …….. bending vibrations
a- lower than b- higher than c- equal to d- none of these

8) The increase in the value of λ_{max} is called …….
a- red shift b- blue shift c- hyperchromic effect d- none of these

9) Hypochromic effect is …….. in intensity of the band
a- increase b- decrease c- both a & b d- none of these

10) n-π* transition in UV requires energy ……. σ-σ* transition
a- lower than b- higher than c- equal to d- none of these

11) Exocyclic double bond increases λ_{max} by ……. nm
a- 20 b- 30 c- 40 d- 5

12) Alkyl residue in β-position of carbonyl system increases λ_{max} by ….nm
a- 12 b- 10 c- 18 d- 25

13) The force bond constant for C=N group equal to ……..
a- 5×10^5 b- 15×10^5 c- 10×10^5 d- 20×10^5

14) The value of wave number depends on ……
a- charge of atom b- atomic masses of vibrating atoms
c- force bond constant d- both b & c

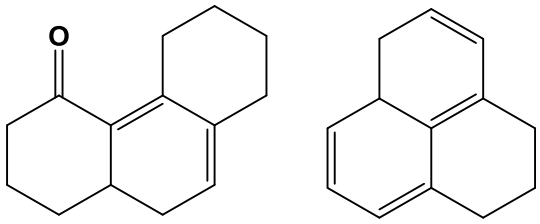
15) The compound which absorbs in IR has Δν ……..
a- > zero b- < zero c- equal zero d- none of these
16) Electron withdrawing groups …… value of wave number
a- decrease b- not affect c- increase d- none of these
17) Auxochromic group …… the value of λ_{max}
a- not affects b- decreases c- increases d- none of these
18) Chromophoric group is ……. group
a- unsaturated b- saturated c- neutral d- none of these
19) n-π* transition has …….wavelength than π-π*
a- higher b- smaller c- equal d- none of these
20) The finger print region is also called the ……..
a- bending region b- stretching region c- IR region d- all of these
21) Ethanol has …….. types of protons in NMR spectrum
a- 5 b- 2 c- 4 d- 3
22) Ethanal has …….. types of protons in NMR spectrum
a- 3 b- 2 c- 1 d- 4
23) Toluene has …….. types of protons in NMR spectrum
a- 2 b- 1 c- 3 d- 4
24) Electron donating groups …….. the value of chemical shift
a- not affect b- decrease c- increase d- all of these
25) The tallest peak in mass spectra is called …….. peak
a- molecular ion b- base c- metastable d- all of these
26) λ_{max} for compound $CH_3CH=CH-CHO$ is …….. nm
a- 342 b- 265 c- 229 d- 273
27) The solvents used in NMR spectroscopy are ……..
a- CCl_4 b- $CDCl_3$ c- CD_3COCD_3 d- all of these
28) The molecular weight of compound is represented in MS by ….. peak
a- molecular ion b- base c- metastable d- all of these
29) A compound with molecular weight equal to 100 must have …….
number of nitrogen atoms
a- odd b- even c- no d- none of these
30) Acetylacetone has …….. signals in NMR spectrum
a- 6 b- 5 c- 3 d- 4

[II] How can you distinguish by IR: [8 x 1.5 = 12 marks]

a) 1-Butene & 2-butene
b) Formaldehyde & acetaldehyde
c) Acetic acid & propanoic acid
d) Cyclohexanone & cyclopentanone
e) Benzoic acid & 2-hydroxybenzoic acid
f) Butanal & 2-Butenal
g) 4-Aminobenzoic acid & 4-chlorobenzoic acid
h) Acetone & ethyl methyl ketone

[III] What are the advantages of using TMS as standard solvent in NMR spectroscopy? **[2 marks]**

[IV] Calculate λ_{max} for: **[2 x2 = 4 marks]**



Model Answer (317Ch) 1st Term

[I]

1 d	**11 d**	**21 d**
2 d	**12 a**	**22 b**
3 a	**13 c**	**23 a**
4 c	**14 d**	**24 b**
5 d	**15 a**	**25 b**
6 a	**16 c**	**26 c**
7 b	**17 c**	**27 d**
8 a	**18 b**	**28 a**
9 b	**19 a**	**29 b**
10 a	**20 a**	**30 d**

[II]

a) ύ of C=C in 1-butene > ύ of C=C in 2-butene

b) ύ of C=O in Formaldehyde > ύ of C=O in acetaldehyde

c) ύ of C=O in Acetic acid > ύ of C=O in propionic acid

d) ύ of C=O in cyclopentanone > ύ of C=O in cyclohexanone

e) ύ of C=O in Benzoic acid > ύ of C=O in 2-hydroxybenzoic acid

f) ύ of C=O in Butanal > ύ of C=O in 2-butenal

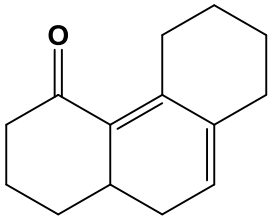
g) ύ of C=O in 4-chlorobenzoic acid > ύ of C=O in 4-aminobenzoic acid

h) ύ of C=O in Acetone > ύ of C=O in ethyl methyl ketone

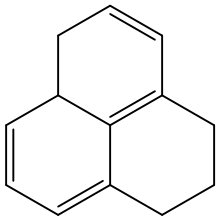
[III] Advantages of TMS:

a) has 12 equivalent protons
b) Inert
c) Has low boiling point

[IV]



λ_{max} = 359 nm



λ_{max} = 390 nm