



III Semester M.Sc. Examination, January 2019

(CBCS)

CHEMISTRY

303 : OC : Organic Spectroscopy

Time : 3 Hours

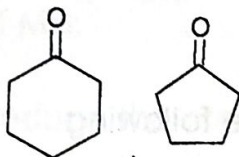
Max. Marks : 70

Instruction : Answer question no. 1 and any five of the following.

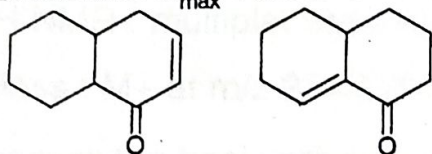
1. Answer any ten of the following :

(10×2=20)

- a) Which of the following has higher stretching frequency for carbonyl group ?
Give reason.



- b) Calculate λ_{\max} value for the following compounds using Woodward-Fieser rules.



- c) Write briefly the solvent effect on $n \rightarrow \pi^*$ transition in UV spectroscopy.
- d) Differentiate chemically equivalent and magnetically equivalent protons taking suitable example.
- e) Integration is used in the interpretation of PMR but not for ^{13}C MR. Why ?
- f) What are deuterium exchange reactions ? Mention their importance.
- g) Write the structure of an organic compound (MF : $\text{C}_3\text{H}_4\text{Cl}_2\text{O}$) that shows a singlet in its PMR spectrum.
- h) How do you differentiate between Cis- and trans-protons in an olefin by ^1H -NMR ?
- i) How do you distinguish acetanilide and N-methyl benzamide by ^{13}C NMR ?
- j) State nitrogen rule and give its importance in mass spectrometry.
- k) Deduce the structure of the compound from following spectral data :
Mol. formula : $\text{C}_{10}\text{H}_{12}\text{O}_2$
IR : 1780, 2985, 1600 cm^{-1}
 ^1H NMR = 1.2 (d,6H), 3.8(septet, 1H) and 7.8 (s, 5H).
- l) EI-MS are recorded only in rarified gaseous state. Explain.



2. a) A compound with M.F $C_6H_{10}O$ gave the following spectral data. uv : λ_{max} : 237 ($\epsilon = 11700$) and 310 ($\epsilon = 57$) IR : 3020, 2980, 1680 (vs) and $1460^{-1}cm$. Deduce the structure of the compound.
- b) How do you distinguish between intramolecular and intermolecular hydrogen bonding using IR spectroscopy ?
- c) Explain the factors affecting group frequencies in IR spectroscopy. (4+3+3=10)
3. a) Discuss anisotropic effects prevalent in 1H NMR for
- Alkenes
 - Alkynes.
- b) Write a note on chemical shift reagents :
- c) Give an example each for compounds which exhibit the following spin-systems according to Pople's nomenclature. (4+3+3=10)
- AX,
 - AM_2 ,
 - AB and
 - A_3X_2 .
4. a) Write briefly about off resonance decoupled ^{13}C NMR spectrum.
- b) Account on Nuclear Overhauser effect.
- c) Discuss ^{19}F NMR spectroscopy. (3+4+3=10)
5. a) Explain the mechanism of McLafferty rearrangement taking suitable example.
- b) Deduce the structure of an organic compound with mol.wt, 150 shows the following spectral data :
- UV : λ_{max} 276 nm ; IR : 3030-2979, 1695, 1692 cm^{-1}
- 1H NMR = 2.1(s, 3H), 3.85(s, 3H), 7.2(d, 2H) and 7.65(d, 2H)
- c) Write briefly about FAB method of ionisation and give its advantages over other methods of ionisation. (4+3+3=10)



6. a) Write the comparison between IR and Raman.
b) Comment on the ^1H NMR spectra of completely pure and slightly impure ethanol sample.
c) Give an account on vicinal coupling and geminal coupling. **(3+3+4=10)**
7. a) Write note on COSY.
b) Sketch proton coupled, proton decoupled and off-resonance decoupled ^{13}C NMR of 4-methyl acetophenone.
c) Illustrate the genesis and applications of isotope ion peaks in interpretation of MS. **(3+3+4=10)**
8. a) Deduce the structure of an organic compound containing halogen which has following spectral data :
 ^1H NMR : multiplet between 7-7.5
Mass : M^+ at m/z 234/236/238. Other fragment ion peaks at m/z 155/157.
b) Discuss the basic principle of mass spectrometry.
c) Deduce the structure of unknown compound (MF : $\text{C}_4\text{H}_7\text{N}$) which has following spectral data :
IR : 2941, 2275, 1460 cm^{-1}
 ^1H NMR = 1.33(d, 6H, $J = 6.5$ Hz), 2.72(m, 1H, $J = 6.5$ Hz). **(3+3+4=10)**
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III Semester M.Sc. Examination, January 2019
(CBCS)

CHEMISTRY

302 – OC : Chemistry of Natural Products

Time : 3 Hours

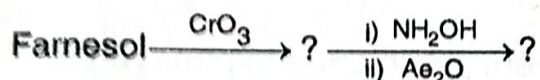
Max. Marks : 70

Instruction : Answer question No. 1 and any five of the following.

1. Answer any ten of the following :

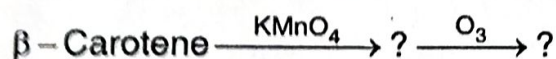
(10×2=20)

a) Predict the products in the following :



b) What is isoprene rule ? Explain with example.

c) Formulate the reaction in the following :

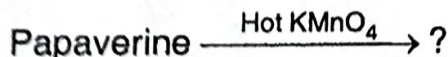


d) How the presence of secondary amino group in ephedrine was confirmed ?

e) How the following interconversion is achieved ?



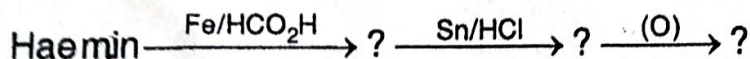
f) Predict the product.



g) Draw the structure of purine base present in nucleic acids.

h) What are the deficiency diseases of Vitamin B₁₂ ?

i) Formulate the reaction in the following :



j) Write the stereochemical structure of PGE1 and PGE2. Indicate the differences between them.

k) Explain the role of insect pheromones in pest control.

l) What are prostaglandins ? Give any two biological functions of prostaglandins ?