



DI-003-001607

Seat No. _____

B. Sc. (Sem. VI) (CBCS) Examination

March - 2022

Chemistry : C-602

(Organic Chemistry & Spectroscopy)

(Old Course)

Faculty Code : 003

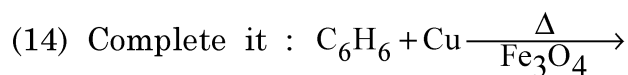
Subject Code : 001607

Time : $2\frac{1}{2}$ Hours]

[Total Marks : 70

1 Give answer of following questions : **20**

- (1) Write the structure of isoprene.
- (2) Define : Amino acid.
- (3) Give full name of RDX.
- (4) Write structure of diphenyl methane.
- (5) Draw completely eclipsed structure of n-Butane.
- (6) Give full name of NMR.
- (7) Predict the NMR spectrum of ethyl chloride.
- (8) Explain the principle of mass spectroscopy.
- (9) Define molecular ion.
- (10) Give full name of U.V.
- (11) Complete it : Citral + $\text{KHSO}_4 \rightarrow$
- (12) Write the structure of zwitter ion.
- (13) Define : Agrochemicals.



(15) Draw sawhorse structure of Ethane.

(16) Which solvents are used in NMR spectroscopy ?

(17) Define induced magnetic field.

(18) Give full name of DBE.

(19) Give example of Retro-Diels Alder reaction.

(20) Define Base Peak.

2 (a) Give answer of following questions : (any **three**) **6**

(1) Complete it : Citral + $\text{Br}_2 \rightarrow$

(2) Define : Peptides

(3) Define : Polynuclear aromatic hydrocarbons

(4) Define : Conformation

(5) Define the term terpene and Terpenoids.

(6) Draw boat and chair form of cyclohexane.

(b) Give answers of following questions : (any **three**) **9**

(1) Give synthesis method of citral.

(2) Explain method of preparation of amino acid by Erlenmeyer oxazolone method.

(3) Give any two method of preparation of Biphenyl.

(4) Define conformational analysis.

(5) Synthesis of α -Terpineol from p-toluic acid.

(6) Explain Bergmann method to preparation of polypeptides.

- (c) Give answer of following questions : (any **two**) **10**
- (1) Explain constitution of α -Terpeniol.
 - (2) Synthesis of : (a) Muskxylene (b) Carbendazin
 - (3) Explain Nitration, halogenation, sulphonation reaction of Naphthalene.
 - (4) Explain conformational analysis of n-Butane.
 - (5) Explain constitution of Thyroxin.
- 3** (a) Give answer of following questions : (any **three**) **6**
- (1) Why ^{12}C , ^{16}O , ^{32}S do not show NMR spectra ?
 - (2) Define equivalent and non-equivalent protons.
 - (3) What information can be obtained from mass spectroscopy ?
 - (4) What is fragment ion ?
 - (5) What is Parent Peak ?
 - (6) State the basic principle of NMR spectroscopy.
- (b) Give answer of following questions : (any **three**) **9**
- (1) Discuss importance of TMS in NMR spectroscopy.
 - (2) Which information gives IR spectrum.
 - (3) Explain the principle of mass spectroscopy.
 - (4) Define spin-spin coupling constant.
 - (5) Discuss 'Deuterium labelling'.
 - (6) Sketch the NMR spectrum of Ethyl benzoate.

(c) Give answer of following questions : (any **two**) **10**

- (1) Write a note on mass instrumentation.
- (2) Explain the factors affecting chemical shift in NMR spectra.
- (3) A compound with molecular formula $C_8H_8O_2$ IR :
3400_(b), 2950, 2530, 1715, 1304, 1050 cm^{-1}
NMR :

- (a) Singlet δ 2.01 (3 μ)
- (b) Singlet δ 10.5 (1 μ)
- (c) Multiplet δ 7.15 (4 μ)

Prove the propose structure consistent with given data.

- (4) Write a short note on the general modes of fragmentation.
- (5) Determine the molecular structure for the following from the data :
 - (i) Molecular weight : 174 g/mole
 - (ii) C = 55.1%; H = 8.0%
 - (iii) UV = λ max 180 nm
 - (iv) IR spectral data : 2941, 2850, 1740, 1450, 1020 cm^{-1}

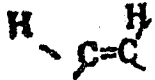
(v) NMR spectral data :

(a) Quartlet : δ 4.14 (4 μ)

(b) Singlet : δ 2.6 (4 μ)

(c) Triplet : δ 1.27 (6 μ)

Spectral Data

Infra - Red Data		
Alkene (stretching)	-C-H	2850-2960(v)
Alkene	=C-H	3100-3200(m)
Alkyene	=C-H	3200-3300(s)
Aromatic	ArC-H	3010-3100(m)
Aromatic ring	C=C	1500-1600(v) (two to three)
Alkene	>C=C<	1610-1680(v)
Alkyene	-C≡C-	2100-2260(s)
Alkene (Bending)	-C-H	1340(w)
	-C(C ₂ H ₅) ₃	1480-1470(m) & 1380-1385(s)
	-C(CH ₃) ₃	1365 (s)
Aldehyde	-C-H	2820-2000(w)&2850 2760(s)
Aldehyde	C=O	1740-1720(s)
Ketone	C=O	1725-1710(s)
Carboxylic acid	C=O	1725-1700(s)
Ester	C=O	1750-1730(s)
Amide	C=O	1670-1640(s)
Anhydride	C=O	1810-1860(s)&1740-1790
Alcohols, Ethers, esters		
Carboxylic acids, Anhydride	C-O	1300-1000(s)
Alcohols, phenols :		
Free	O-H	3650-3600(sh)
bonded	O-H	3500-3200(b)
Carboxylic acids free		
Free	O-H	3500-3650(m)
H-bonded	O-H	2500-3200(b)
amines (stretch)	N-H	3330-3500(m)
Bnding	N-H	1640-1550(m)
Nitrile	-C≡N	2210-2280(s)
Ether	-O-	1070-1150(s)
Alkene bending		-690(s)
disubstituted Cis.		
disubstituted Trans.		960-970(s).
Aromatic substitution :		
Type C-H out of plane bending		
No. of adjacent H atom.		range cm
5		750(s) & 700(s)
4		750
3		780
2		830
1		850

NMR Data : Chemical Shift

Types of proton		Chemical shift in δ_{ppm}
Primary	R-CH ₃	0.9
Secondary	R ₂ -CH ₃	1.3
Tertiary	R ₃ -CH	1.5
Vinylic	C=C-H	4.6-5.9
Acetylinic	C≡C-H	2.3
Aromatic	Ar-H	6-8.5
Benzylic	Ar-C-H	2.2-3
Allylic	C=C-CH ₃	1.7
Fluorides	H-C-F	4-4.5
Chlorides	HC-Cl	3.4
Bromides	HC-Br	2.5-4
Iodides	HC-I	2.4
Alcohols	HC-OH	3.4-4
Ethers	HC-OR	3.3-4
Esters	R-COO-CH	3.7-4.1
Acids	HC-COOH	2-2.6
Carbonyl comp.	HC-C=O	2-2.7
Aldehyde	R-CHO	9-10
Hydroxylic	R-OH	1-5.5
Phenolic	Ar-OH	4-12
Carboxylic	R-COOH	10.5-12
Amino	R-NH ₂	1.5