

B.Sc. Semester - 6 (CBCS) Examination

March/April-2023 (OLD COURSE)

ORGANIC CHEMISTRY AND SPECTROSCOPY(CORE)

Time: 2:30 Hours

Marks: 70

Instructions:

1. All questions are compulsory.
2. Figures to the right indicate marks.

Q.1(A) Answer the following question. (04)

Draw the structure of following α -amino acids

1. Glycine
2. Tyrosine
3. Alanine
4. Aspartic acid

Q.1(B) Answer the following questions. (Any Two) (10)

1. Write the reaction of Glycine with HONO, NOCl, HI and LiAlH₄.
2. Prove the structure of Thyroxine by synthetic method.
3. What is essential and non essential α -amino acids, give two examples of each?

Q.2(A) Answer the following question. (04)

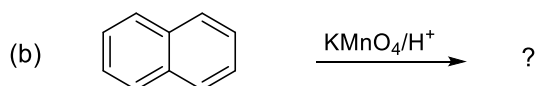
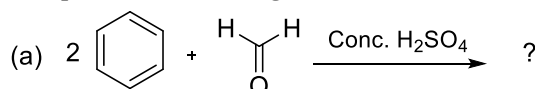
Give the synthesis and uses of RDX

Q.2(B) Answer the following questions. (Any Two) (10)

1. Give the synthesis of Citral
2. Give the synthesis and uses of Musk-xylene.
3. Explain with evidences, presence and position of alcoholic -OH group in α -Terpineol

Q.3(A) Answer the following question. (04)

Complete the following reaction,



Q.3(B) Answer the following questions. (Any Two) (10)

1. Give any one synthesis of Anthracene and write their reaction of nitration and oxidation
2. Give Fischer Indole synthesis with proper mechanism.
3. Give Skraup synthesis with proper mechanism.

Q.4(A) Answer the following question. (04)

Calculate ¹H-NMR signals for following compounds with notification,

1. 1,2-Dibromo propane
2. Methyl cyclo propane

Q.4(B) Answer the following questions. (Any Two) (10)

1. Why TMS is used as a reference in NMR spectroscopy.
2. Determine the structure of following spectral data.

Molecular weight :- 262 gm/mole

Element analysis : C = 36.4 % , H = 3.06 % , Br = 60.54 %

NMR data:

Types of Proton	No. of Proton	Multiplicity	δ ppm
A	4H	Singlet	7.31
B	4H	Singlet	4.56

3. Explain : Deuterium labelling method in NMR spectroscopy

Q.5(A) Answer the following question.

(04)

Determine the structure from following spectral data.

Molecular formula :- C_5H_8

IR data : $3310, 2160\text{ cm}^{-1}$

NMR data:

Types of Proton	No. of Proton	Multiplicity	$\delta\text{ ppm}$
A	6H	Doublet	1.23
B	1H	Septet	2.74
C	1H	Singlet	2.26

Q.5(B) Answer the following questions. (Any Two)

(10)

1. Determine the structure of following spectral data.

Molecular Weight : 131 gm/mole

Element analysis : C = 73.27 %, H = 3.84 %, N = 10.68 %

IR-data : $2260, 1735\text{ cm}^{-1}$

NMR data:

Types of Proton	No. of Proton	Multiplicity	$\delta\text{ ppm}$
A	2 H	Doublet	8.11
B	2 H	Doublet	8.03
C	1 H	Singlet	9.89

2. Write a note on “General Fragmentation Modes” in mass spectroscopy.

3. List out different types of conformational isomers of Cyclohexane and draw energy diagram for them.

Spectroscopic data

U. V.

Far U.V. Region	= 100 to 200 nm
Near U. V. Region	= 200 to 380 nm
Visible Region	= 380 to 780 nm

IR:

Alkyne C-H str.	3350-3300 cm^{-1}
Aromatic C-H str.	3100-3000 cm^{-1}
Alkane C-H str.	3000-2900 cm^{-1}
Nitrile C-N str.	2300-2200 cm^{-1}
Alkyne $\text{C}\equiv\text{C}$ str.	2190-2100 cm^{-1}
Carbonyl $\text{C}=\text{O}$ str.	1800-1680 cm^{-1}
Alkane C-H bend	1470-1420 cm^{-1}
Ester C-O-C str.	1300-1000 cm^{-1}

NMR:

δ_{ppm}

Alkane C-H	0.9 – 2.5 δ_{ppm}
Alkyne C-H	2.5 – 3.9 δ_{ppm}
Alkene C-H	5.5 – 6.5 δ_{ppm}
Aromatic C-H	6.5 – 8.5 δ_{ppm}
Phenolic O-H	4.4 – 8.8 δ_{ppm}
Aldehydic C-H	8.0 – 10.0 δ_{ppm}
Acidic O-H	10.0 – 12.5 δ_{ppm}