

V.P. & R. P. T. P. SCIENCE COLLEGE
INDUSTRIAL CHEMISTRY VOCATIONAL

B. Sc. - Semester – V

COURSE NO: US05CICV01 – ORGANIC CHEMISTRY

Date & Day: 1st October 2019, Tuesday

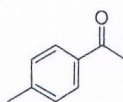
TIME: 11:00 to 12:15

TOTAL MARKS – 25

Q.1 Answer the following MCQs

(05)

- Hemolytic cleavage of a bond generates _____.
A. Free radical
B. Carbenes
C. Carbonium ion
D. Carbanions
- Aldehyde having ____ undergo aldol condensation.
A. α -hydrogen
B. β -hydrogen
C. γ -hydrogen
D. δ -hydrogen
- Lithium Aluminium Hydride is an important ____ reagent.
A. Reducing
B. Oxidizing
C. Brominating
D. Methylating
- How many signals would you expect to see in the $^1\text{H-NMR}$ spectrum of the following compound?



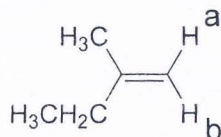
A) 6

B) 4

C) 5

D) 3

5. The protons marked Ha and Hb in the molecule below are _____.



- A) Vicinal protons B) Geminal protons C) Isolated Protons D) Equivalent Protons

Q.2 What are electrophiles and Nucleophiles? Give an example.

(05)

OR

Q.2 What are carbocations and carbanions? Explain the stability of primary, secondary and tertiary carbocations and carbanions.

(05)

Q.3 Describe the mechanism and important applications of Friedel–Craft's Reaction and Meerwein–Ponndorf–Verley Reduction,

(05)

OR

Q.3 Write a note on "Pinacol–Pinacolone Rearrangement".

(05)

Q.4 Write short note on "N- Bromosuccinimide" as a reagent of synthetic importance.

(05)

OR

Q.4 Write a note on Lead tetra acetate.

(05)

OR

Q.5 From the following sets of N.M.R., IR and UV data, give a structure

(05)

Molecular weight: 264 gm/mol; %age: C=36.30%, H=3.1% and Br=60.6%; UV: λ_{max} : 210nm; NMR: δ 4.65 (singlet, 20.0sq) and 7.30 (singlet, 20.0sq).

OR

Q.5 Q.6 Write a note on IR spectroscopy and its applications.

(05)



Characteristic Infrared Absorption Frequencies.

Bond	Compound type	Frequency range cm^{-1}
C-H	Alkanes.	2850-2960, 1350-1470.
C-H	Alkenes.	3020-3080 (m), 675-1000.
C-H	Aromatic rings.	3000-3100 (m), 675-870.
C-H	Alkynes.	3300
C=C	Alkenes.	1640-1680 (v)
C \equiv C	Alkynes.	2100-2260 (v)
C=C	Aromatic rings.	1500, 1600 (v)
C-O	Alcohols, Ethers, Carboxylic acids, Esters.	1080-1300
C=O	Aldehyde, Ketones, Carboxylic acids, Esters.	1690-1760
O-H	Monomeric alcohols, Phenols	3610-3640 (v)
	Hydrogen bonded alcohols, Phenols.	3200-3600 (broad)
	Carboxylic acids.	2500-3000 (broad)
N-H	Amines.	3300-3500 (m)
C-N	Amines.	1180-1360.
C \equiv N	Nitriles.	2210-2260 (v)
-NO ₂	Nitro compounds	1515-1560, 1345-1385

Double Bonds	
Structure unit	Frequency cm^{-1}
C=C	1620-1680
C=O	
Aldehydes and ketones	1710-1750
Carboxylic acids	1700-1725
Acid anhydrides	1800-1850 & 1740-1790
Acyl halides	1770-1815
Esters	1730-1750
Amides	1680-1700
Substituted derivatives of Benzene	
Mono substituted	730-770 & 690-710
Ortho-disubstituted	735-770
Meta-disubstituted	750-810 & 680-730
Para-disubstituted	790-840

Characteristic Proton Chemical Shift

Type of Proton	Chemical shift δ , ppm	Type of Proton	Chemical shift δ , ppm
Cyclopropane	0.2	Alcohols	H-C-OH 3.4 - 4
Primary	R-CH ₃ 0.9 - 1.8	Ethers	H-C-OR 3.3 - 4
Secondary	R ₂ CH ₂ 1.3	Esters	RCOO-C-H 3.7 - 4.1
Tertiary	R ₃ CH 1.5	Esters	H-C-COOR 2 - 2.2
Vinyllic	C=C-H 4.6 - 5.9	Acids	H-C-COOH 2 - 2.6
Acetylenic	C \equiv C-H 2 - 3	Carbonyl compounds	H-C-C=O 2 - 2.7
Aromatic	Ar-H 6 - 8.5	Aldehydic	RCH=O 9 - 10
Benzylic	Ar-C-H 2.2 - 3	Hydroxylic	RO-H 1 - 5.5
Allylic	C=C-C-H 1.7	Phenolic	ArO-H 4 - 12
Fluorides	H-C-F 4 - 4.5	Enolic	C=C-O-H 15 - 17
Chlorides	H-C-Cl 3 - 4	Carboxylic	RCOO-H 10.5 - 12
Bromides	H-C-Br 2.5 - 4	Amino	R-NH ₂ 1 - 5
Iodides	H-C-I 2 - 4		

