



V.P. & R. P. T. P. SCIENCE COLLEGE

B. Sc. (Semester - V) Examination - INDUSTRIAL CHEMISTRY

29th September 2018, Saturday

COURSE NO: US05CICH01 (ORGANIC CHEMISTRY - II)

TIME: 10.00 TO 12.00 PM.

TOTAL MARKS - 50

Q.1 Answer the following MCQs. (08)

1. Pyridine reacts with HCl to form.....
A. Pyridinium chloride
B. 2-Chloropyridine
C. 3-Chloropyridine
D. All of these
2. Pyridine undergoes electrophilic substitution with fuming H_2SO_4 at $350^\circ C$ to give.....
A. 3-Pyridinesulphonic acid
B. 2-Pyridinesulphonic acid
C. 4-Pyridinesulphonic acid
D. None of these
3. Anthracene undergoes electrophilic substitution reactions mainly at....
A. C-1
B. C-2
C. C-9
D. C-1 and C-2
4. Anthracene undergoes oxidation with $O_2 + V_2O_5$, at $500^\circ C$ to give.....
A. Anthraquinone
B. Benzoic acid
C. Phthalic acid
D. None of them
5. N - Bromosuccinimide is an important reagent for.....
A. Brominating
B. Reducing
C. Oxidizing
D. Methylating.
6. Lead tetra acetate is an important reagent for.....
A. Oxidizing
B. Acetoxylation
C. Methylating
D. All of these.
7. How many NMR signals do you expect in CH_3COCH_3 .
A. One
B. Two
C. Three
D. Four
8. How many NMR signals do you expect in $CH_3CH_2COCH_3$.
A. One
B. Two
C. Three
D. Four

Q.2 Answer the following short questions (ANY FIVE) (10)

1. Compare the basicity of Pyridine with that of Pyrrole
2. Write a rule for naming mono heterocyclic compound with suitable examples.
3. Write a synthesis of α - and β -Naphthol from Naphthalene.
4. Write resonating structures for Phenanthrene.
5. Give the preparation and uses of Aluminum isopropoxide.
6. Give the preparation and uses of N- Bromosuccinimide.
7. How many signals would you see in the NMR spectra of Butanone.
8. Why TMS (Tetra Methyl Silane) used as Reference Material in 1H NMR spectroscopy?

Q.3 Discuss the structure of Pyrrole, Furan and Thiophene. (08)

OR

Q.3 Write note on Nucleophilic substitution in Pyridine. (08)

Q.4 How will you arrive at the structure of Naphthalene? (08)

OR

Q.4 Discuss the structure of Anthracene with justification of their reactions. (08)

Q.5 Write note on Meerwein-Ponndorf-Verley Reduction. (08)

OR

Q.5 Describe the mechanism and application of the Benzilic Acid Rearrangement. (08)

Q.6 From the following sets of N.M.R., IR and UV data, give a structure of any two. (08)

1. Molecular weight: 100 gm/mol; %age: C=72.00%, H=12.0%; UV: λ_{max} : 292nm; IR: 2930, 1712, 1261 cm^{-1} ; NMR: δ 1.60 (singlet, 23.20sq), δ 1.45 (doublet, 15.00sq), δ 1.25 (multiplet, 7.50sq) and δ 0.92 (doublet, 45.00sq).
2. Molecular weight: 60 gm/mol; %age: C=26.67%, H=2.22%, O=71.11%; UV: λ_{max} : 292nm; IR: 2500-3000, 1720, 1120 cm^{-1} ; NMR: δ 10.92 (singlet, 2H).
3. Molecular weight: 88 gm/mol; %age: C=54.54%, H=13.64%, N=31.82%; UV: λ_{max} : 220nm; IR: 2860, 1120 cm^{-1} ; NMR: δ 3.6 (singlet, for all protons).



Characteristic Infrared Absorption Frequencies.

Bond	Compound type	Frequency range cm^{-1}
C-H	Alkanes.	2850-2960, 1350-1470.
C-H	Alkenes.	3020-3080 (<i>m</i>), 675-1000.
C-H	Aromatic rings.	3000-3100 (<i>m</i>), 675-870.
C-H	Alkynes.	3300
C=C	Alkenes.	1640-1680 (ν)
C \equiv C	Alkynes.	2100-2260 (ν)
C=C	Aromatic rings.	1500, 1600 (ν)
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 (ν)
	Hydrogen bonded alcohols, Phenols.	3200-3600 (<i>broad</i>)
	Carboxylic acids.	2500-3000 (<i>broad</i>)
N-H	Amines.	3300-3500 (<i>m</i>)
C-N	Amines.	1180-1360.
C \equiv N	Nitriles.	2210-2260 (ν)
-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	Ethers	H-C-OR	3.3 - 4
Secondary	R ₂ CH ₂	Esters	RCOO-C-H	3.7 - 4.1
Tertiary	R ₃ CH	Esters	H-C-COOR	2 - 2.2
Vinylic	C=C-H	Acids	H-C-COOH	2 - 2.6
Acetylenic	C \equiv C-H	Carbonyl compounds	H-C-C=O	2 - 2.7
Aromatic	Ar-H	Aldehydic	RCH=O	9 - 10
Benzylic	Ar-C-H	Hydroxylic	RO-H	1 - 5.5
Allylic	C=C-C-H	Phenolic	ArO-H	4 - 12
Fluorides	H-C-F	Enolic	C=C-O-H	15 - 17
Chlorides	H-C-Cl	Carboxylic	RCOO-H	10.5 - 12
Bromides	H-C-Br	Amino	R-NH ₂	1 - 5
Iodides	H-C-I			