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

B. Sc. (Semester - V) Examination

INDUSTRIAL CHEMISTRY

29th September 2016, Thursday

COURSE NO: **US05CICH01** (ORGANIC CHEMISTRY - II)

TIME: 11.00 TO 12.30 PM. TOTAL MARKS – 25

Q.1 Answer the following MCQs. (03)

1. Pyridine reacts with HCl to form
   - A. Pyridinium chloride
   - B. 2-Chloropyridine
   - C. 3-Chloropyridine
   - D. All of these.
2. Lead tetra acetate is an important _____ reagent.
   - A. Oxidizing
   - B. Acetoxylatingc.
   - C. Methylating
   - D. All of these
3. Signal pattern of the CH_3 protons in the NMR spectra of the $CH_3CH_2Br_2$ and CH_3COOH is.....
   - A. Triplet & Singlet
   - B. Doublet & Singlet
   - C. Triplet & Doublet
   - D. None of them

Q.2 Answer the following short questions (ANY TWO) (04)

1. What mean by heterocyclic compound? Enlist various heterocyclic compounds with their names.
2. Giving suitable examples, define term "free radicals".
3. Write about information obtained from IR Spectroscopy.

Q.3 Write notes on Electrophilic substitution in Furan. (06)

OR

Q.3 Giving suitable examples, explain Nucleophilic substitution in Pyridine. (06)

Q.4 Write a note on "Aluminum isopropoxide" as a reagent of synthetic importance. (06)

OR

Q.4 Discuss the "Pinacol–Pinacolone Rearrangement". (06)

Q.5 From the following sets of N.M.R., IR and UV data, give a structure consistent with each of the following: (06)

Molecular weight: 130gm/mol; %age: C=73.84%, H=13.84% and O=12.34%; UV: λmax: 200nm; NMR: δ 1.1 (singlet for all protons).

OR

Q.5 From the following sets of N.M.R., IR and UV data, give a structure consistent with each of the following: (06)

Molecular weight: 60 gm/mol; %age: C=26.67%, H=2.22%, O=71.11%; UV: λmax: 292nm; IR: 2500-3000, 1720, 1120cm-1.; NMR: δ 10.92 (singlet, 2H).

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≡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≡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_2CH_2	1.3	Esters	RCOO-C-H	3.7 – 4.1
Tertiary	R_3CH	1.5	Esters	H-C-COOR	2 – 2.2
Vinylic	C=C-H	4.6 -5.9	Acids	H-C-COOH	2 – 2.6
Acetylenic	C≡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			