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

B. Sc. (Semester - V) Examination

INDUSTRIAL CHEMISTRY

30th September 2013, Monday

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

TIME: 3.30 TO 5.00 PM. TOTAL MARKS – 30

Q.1 Answer the following Multiple Choice Questions. (06)

1. Pyridine undergoes Nuclophilic substitution with $NaNH_2$ at 100°C to form...
   - A. 2-Aminopyridine
   - B. 3-Aminopyridine
   - C. 4-Aminopyridine
   - D. None of these
2. Which of the following reagents will react with pyrrole to form 2-formylpyrrole are
   - A. HCOOH
   - B. $CHCl_3/KOH$
   - C. H_2O_2
   - D. $(CH_3C0)_20/SnC1_4$
3. _____ is a specific reducing agent for the reduction of carbonyl compounds to alcohols without affecting other sensitive reducible groups.
   - A. $(Me_2CHO)_3Al$
   - B. $NaBH_4$
   - C. $LiAlH_4$
   - D. OsO_4
4. Osmium Tetraoxide is used for...
   - A. Reduction
   - B. Oxidation
   - C. Hydroxylation
   - D. Methylation.
5. How many NMR signals do you expect from Acetone and Ethanol?
   - A. 1 & 2 respectively
   - B. 1 & 3 respectively
   - C. 2 & 3 respectively
   - D. None of these
6. The DBE value For molecular formula - $C_9H_{10}O_2$ is
   - A. 1
   - B. 2
   - C. 5
   - D. None of these

Q.2 Answer the following short questions (**Any three**) (06)

1. Give rules for naming mono heterocyclic compound.
2. Compare the basicity of Pyridine with that of Pyrrole.
3. Give synthesis of Aluminum isopropoxide.
4. Differentiate the term Reaction and Rearrangement.
5. Give applications of IR Spectroscopy.
6. Enlist the information obtained from H^1NMR Spectroscopy.

Q.3 Discuss the structure of Thiophene. (06)

OR

Q.3 Write a note on "Electrophilic substitution in Pyridine". (06)

Q.4 Write a preparation and uses of Lead tetra acetate and Selenium dioxide. (06)

OR

Q.4 Write short notes on Aldol condensationreaction and Benzilic Acid 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)

1. 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).
2. Molecular weight: 100 gm/mol; %age: C=72.00%, H=12.0%.; UV: λmax: 292nm; IR: 2930, 1712, 1261cm-1.; NMR: δ 1.60 (singlet, 23.20sq), δ 1.45 (doublet, 15.00sq), δ 1.25 (multiplate, 7.50sq) and δ 0.92 (doublet, 45.00sq).

OR

1. Molecular weight: 88 gm/mol; %age: C=54.54%, H=13.64%, N=31.82%; UV: λmax: 220nm; IR: 2860, 1120cm-1.; NMR: δ 3.6 (singlet, for all protons).
2. Molecular weight: 102gm/mol; %age: C=58.82%, H=9.80%, O=31.38%.; UV: 204nm, ε-max 60.; IR: 2950, 2840, 2660, 1720cm-1.; NMR: δ 10.92 (singlet, 3.2sq), δ 0.92 (singlet, 29.0sq).

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 (ν)
C≡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 (*broad*)
	Carboxylic acids.	2500-3000 (*broad*)
N-H	Amines.	3300-3500 (*m*)
C-N	Amines.	1180-1360.
C≡N	Nitriles.	2210-2260 (ν)
$-NO_2$	Nitro compounds	1515-1560, 1345-1385

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-	2 – 2.7
Aromatic	Ar-H	6 - 8.5	C=O		9 – 10
Benzylic	Ar-C-H	2.2 - 3	Aldehydic	RCH=O	1 – 5.5
Allylic	C=C-C-	1.7	Hydroxylic	RO-H	4 – 12
H		4 - 4.5	Phenolic	ArO-H	15 – 17
Fluorides	H-C-F	3 - 4	Enolic	C=C-O-H	10.5 – 12
Chlorides	H-C-Cl	2.5 – 4	Carboxylic	RCOO-H	1 – 5
Bromides	H-C-Br		Amino	$R-NH_2$	