

M. B. Patel Science College, Anand
First Internal Test Examination
Subject: Organic Chemistry[C-301]

Date: 17/10/2011
Monday

Total Marks:40
Time: 3:00p.m. to 4:30p.m.

Q-1 (a) Answer the following: (Any Two)

[04]

- (i) What is NMR? What kind of information can be achieved from it?
- (ii) Differentiate between Enantiotopic protons and diastereotopic protons.
- (iii) How will you assign the configuration to geometric isomers by using CMR spectroscopy?
- (iv) Why TMS has been used as a reference point in NMR spectroscopy?

(b) Deduce the structure of compound having following spectral data. Label all kinds of Protons /carbons and give appropriate explanation for the structure.

[Any One]

[04]

- (i) Molecular formula: $C_8H_{10}O_2$
IR(cm^{-1}): 3400,3050,2950,1611,1590,1510,1461,1306,1252,1175,1035,820
NMR (δ , ppm): (a) 7.2, 4H, Quartet (b) 4.4, 2H, Singlet
(c) 3.72, 1H, Singlet (d) 3.81, 3H, Singlet
- (ii) Molecular formula: $C_9H_{13}N$
IR(cm^{-1}): 3400,3050,2960,1600,1500,1375,1200,1120,1050,690,730
NMR (δ , ppm): (a) 7.25, 5H, Singlet (b) 3.75, 2H, Singlet (c) 2.5, 2H, Quartet
(d) 1.25, 1H, Singlet (e) 1.1, 3H, Triplet

(c) Deduce the structure of compound having following spectral data. Label all kinds of Protons /carbons and give appropriate explanation for the structure.

[Any Three]

[06]

- (i) Molecular formula: C_4H_6
NMR (δ , ppm): (a) 0.83, 2H, Doublet $J=2Hz$ (b) 2.13, 3H, Doublet $J=1Hz$
(c) 6.40, 1H, Multiplet
- (ii) Molecular formula: $C_8H_{14}O_2$
CMR (δ , ppm): (a) 13.8, Quartet (b) 18.3, Quartet (c) 19.5 Triplet
(d) 31.1 Triplet (e) 64.5 Triplet (f) 124.7 Triplet
(g) 137.1 Singlet (h) 167.2 Singlet
- (iii) Molecular formula: $C_{10}H_{12}$
NMR (δ , ppm): (a) 0.65, 2H, Multiplet (b) 0.81, 2H, Multiplet
(c) 1.37, 3H, Singlet (d) 7.17, 5H, Singlet
- (iv) Molecular formula: $C_5H_{12}O_2$
CMR (δ , ppm): (a) 19.0, Quartet (b) 39.4 Triplet (c) 55.8 Quartet
(d) 59.3, Triplet (e) 75.1, Doublet
- (v) Molecular formula: $C_4H_6O_2$
NMR (δ , ppm): (a) 2.1, 3H, Singlet (b) 4.5, 1H, Doublet (c) 4.85, 1H, Doublet
(d) 7.28, 1H, Doublet (Quartet)
- (vi) Molecular formula: C_7H_9N
CMR (δ , ppm): (a) 14.3, Quartet (b) 28.2, Triplet (c) 123.4, Doublet
(d) 149.8, Doublet (e) 152.8, Singlet

[P.T.O]

Q-2 (a) Answer the following: [Any Three]

[09]

- (i) D-(+)-Glucose is a pyranose and not a furanose. Explain.
- (ii) Give schematic representation of α -cyclodextrin and discuss the host-guest relationship properties of it. How this properties are contrast to crown ether?
- (iii) Draw the structure of cellulose and discuss its reaction in industrial importance.
- (iv) How Fischer elucidated the configuration of (-)-Arabinose.
- (v) (+)-Lactose is a galactoside and not a glucoside, Explain.
- (vi) B-D-glucose undergoes mutarotation but methyl- β -D-glucoside does not, Explain.

(b) Give the detail synthesis of the following: [Any Two]

[04]

- (i) α -Methyl caproic acid from (-)-Arabinose.
- (ii) S-(+)-2-Butanol from L-(+)-Lactic acid.
- (iii) L-Ascorbic acid from D-(+)-Glucose.
- (iv) (-)-Tartaric acid from (-)-Gulose.

Q-3 (a) Answer the following: [Any Four]

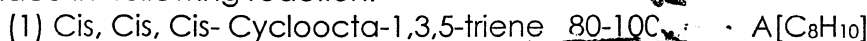
[10]

- (i) What is para-Claisen rearrangement? Show that the allyl moiety never gets completely detached from the substrate.
- (ii) [1,5]-shift of D or H gives the unstable non-aromatic intermediate.
- (iii) What are electrocyclic reaction? Discuss the stereochemistry of these reactions. Using the HOMO concepts, Explain the thermal cyclization of 1,3-butadiene to cyclobutene.
- (iv) [1,3]-C shift proceeds with inversion of configuration in the migrating group, Justify with suitable example.
- (v) Allylic system has special stability.
- (vi) Justify with suitable example that [1,5] migration proceeds with complete retention of configuration.
- (vii) Thermal cyclization of ethylene is symmetry forbidden but photochemical cyclization is symmetry allowed.
- (viii) Racemic 3,4-Dimethyl-1,5-hexadiene give mainly trans,trans-Octadiene, while meso-isomer give predominantly cis,trans.

(b) Answer the following: [Any Two]

[03]

- (i) Give stereochemical structures A and B & tell exactly what process is taking place in following reaction.



- (ii) Cis 2-Butene + trans-2-butene $\xrightarrow{h\nu}$ A+B+C+D.

- (iii) Trans cis-trans-2,4,6-Octatriene $\xrightarrow{h\nu}$?

- (iv) Just sketch the following:

- (a) The HOMO for the excited state of 1,3-butadiene.
- (b) The HOMO for the ground state of 1,3,5-hexatriene.
- (c) The LUMO of ground state of ethylene.

SPECTROSCOPIC DATA TABLES

N. M. R. Chemical Shifts

Type of proton	Chemical shift δ ppm	Type of Proton	Chemical shift δ ppm
Primary	RCH ₃ 0.9	Alcohols	HC-OH 3.4-4
Sec.	R ₂ CH ₂ 1.3	Ethers	HC-OR 3.3-4
Tert.	R ₃ CH 1.5	Esters	RCOO-CH 3.7-4.1
Vinyllic	C=C-H 4.6-5.9	Esters	HC-COOR 2-2.2
Acetylenic C	C≡C-H 2-3	Acid	HC-COOH 2-2.6
Aromatic	Ar-H 6-8.5	Carbonyl	HC-C=O 2-2.7
Benzyllic	Ar-CH ₂ 2.2-3	Aldehydic	RCHO 9-10
Allylic	C=C-CH ₂ 1.7	Hydroxylic	R-OH 1-5.5
Chloride	HC-Cl 3-4	Phenolic	Ar-OH 4-12
Bromides	HC-Br 2.5-4	Enolic	C=C-OH 15-17
Iodides	HC-I 2-4	Carboxylic	R-COOH 10.5-12
		Amino	R-NH ₂ 1-5

CH ₂ -Cl	δ 3.0
R-CH ₂ -Cl	δ 3.4
R ₂ CH-Cl	δ 4.0

CH ₂ -C-Cl	δ 1.5
R-CH ₂ -C-Cl	δ 1.7
R ₂ CH-C-Cl	δ 1.6

CHARACTERISTIC INFRARED ABSORPTION FREQUENCIES^a IR

Bond	Compound type	Frequency range, cm ⁻¹
C-H	Alkanes	2850-2960 1350-1470
	<i>tert</i> -Butyl	unsymmetrical doublet: 1370 (s) 1395 (m)
	isopropyl	"split" 1370 and 1385
	Methyl and methylene groups	1430-1470 confirmed by a band 1170
C-H	Alkenes	3020-3080 (m) 675-1000
	RCH=CH ₂	910-920 cm ⁻¹ 990-1000
	<i>cis</i> -RCH=CHR	675-730 (variable)
C-H	R ₂ C=CH ₂	880-900
	<i>trans</i> -RCH=CHR	965-975
C-H	Aromatic rings	3000-3100 (m) 675-870
	monosubstituted	690 710 cm ⁻¹ 730-770
	<i>m</i> -disubstituted	690-710 750-810
	<i>o</i> -disubstituted	735-770
C-H	<i>p</i> -disubstituted	810-840
	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
	1° ROH	about 1050 cm ⁻¹
	3° ROH	about 1150 cm ⁻¹
	2° ROH	about 1100
	Alkyl ethers	1060-1150 cm ⁻¹
	Aryl and vinyl ethers	1200-1275 cm ⁻¹ (and, weaker, at 1200-1075 cm ⁻¹)
C=O	Aldehydes, 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

Substituent	C-1 (Attachment)	C-2	C-3	C-4	C of Substituent (ppm from TMS)
H	0.0	0.0	0.0	0.0	
CH ₃	+9.3	+0.7	-0.1	-2.9	21.3
CH ₂ CH ₃	+15.4	-0.5	0.6	-2.5	29.2 (CH ₂), 15.8 (CH ₃)
CH(CH ₃) ₂	+20.1	-2.0	0.0	-2.5	34.4 (CH), 24.1 (CH ₃)
CH ₂ (CH ₃) ₂	+22.2	-3.4	-0.4	-3.1	34.5 (C), 31.4 (CH ₃)
CH=CH ₂	+9.1	-2.4	+0.2	-0.5	137.1 (CH), 113.3 (CH ₂)
C≡CH	-5.8	+6.9	+0.1	+0.4	84.0 (C), 77.8 (CH)
CH ₂	+12.1	-1.8	-0.1	-1.6	
CH ₂ OH	+13.3	-0.8	-0.6	-0.4	64.5
CH ₂ OOCCH ₃	+7.7	-0.0	-0.0	-0.0	20.7 (CH ₂), 66.1 (CH ₂), 170.3 (C=O)
OH	+26.5	-12.7	+1.6	-7.3	
OCH ₃	+31.4	-14.4	+1.0	-7.7	54.1
OC ₂ H ₅	+29.0	-9.4	+1.6	-5.3	
OOCCH ₃	+22.4	-7.1	-0.4	-3.2	23.9 (CH ₂), 169.7 (C=O)
CH	+8.2	+1.2	+0.6	+5.8	192.0
CCH ₃	+7.8	-0.4	-0.4	+2.8	24.6 (CH ₂), 195.7 (C=O)
OC ₂ H ₅	+9.1	+1.5	-0.2	+3.8	196.4 (C=O)
OCF ₃	-5.6	+1.8	+0.7	+6.7	
COH	+2.9	+1.3	+0.4	+4.3	168.0
OOCCH ₃	+2.0	+1.2	-0.1	+4.8	51.0 (CH ₂), 166.8 (C=O), 166.5
OCi	+4.6	+2.9	+0.6	+7.0	
ONH ₂	+5.0	-1.2	0.0	+3.4	
C=N	-16.0	+3.6	+0.6	+4.3	119.5
NH ₂	+19.2	-12.4	+1.3	-9.5	
N(CH ₃) ₂	+22.4	-15.7	+0.8	-11.8	40.3
NiCl ₂	+11.1	-9.9	+0.2	-5.6	
NO ₂	+19.6	-5.3	+0.9	+6.0	
N=C=O	+5.7	-3.6	+1.2	-2.8	129.5
F	+35.1	-14.3	+0.9	-4.5	
Cl	+6.4	+0.2	+1.0	-2.0	
Br	-5.4	+3.4	+2.2	-1.0	
I	-22.2	+9.9	+2.6	-7.3	
CF ₃	+2.6	-3.1	+3.4	+3.4	
SH	+2.3	+0.6	+0.2	-3.3	
SCH ₃	+10.2	-1.8	+0.4	-3.6	15.9
SO ₂ NH ₂	+15.3	-2.9	+0.4	+3.3	
Si(CH ₃) ₃	+13.4	+4.4	-1.1	-1.1	

The ¹³C Shift Parameters in Some Linear and Branched Hydrocarbons

¹³ C Atoms	Shift (ppm) (A)
α	+9.1
β	+9.4
γ	-2.5
δ	+0.3
ε	+0.1
1° (3°)	-1.1
1° (4°)	-3.4
2° (3°)	-2.5
2° (4°)	-7.2
3° (2°)	-3.7
3° (3°)	-9.5
4° (1°)	-1.5
4° (2°)	-8.4

Table 5.3 Incremental Substituent Effects (ppm) on Replacement of H by Y in Alkanes. Y is Terminal or Internal* (+ left, - right)

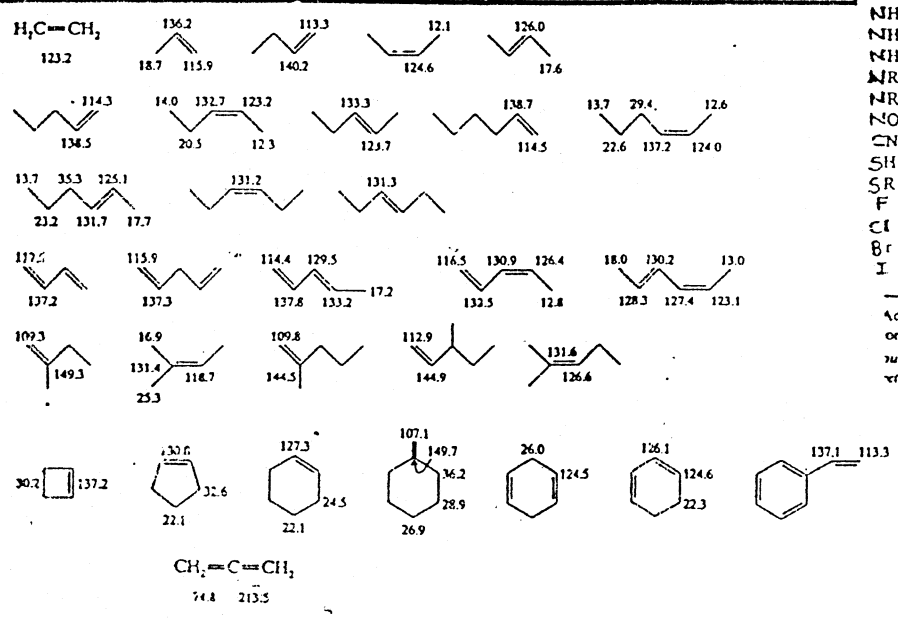
Terminal

Internal

	α		β		γ
	Terminal	Internal	Terminal	Internal	
CH ₃	+9	+6	+10	+8	-2
CH=CH ₂	+20		+6		-0.5
C≡CH	-4.5		+5.5		-3.5
COOH	+21	+16	+3	+2	-2
COO-	+25	+20	+5	+3	-2
COOR	+23	+17	+3	+2	-2
COCl	+33	+28		+2	
CONH ₂	+22		+2.5		-0.5
GOR	+30	+24	+1	+1	-2
CHO	+31		0		-2
Phenyl	+23	+17	+9	+7	-2
OH	+48	+41	+10	+8	-5
OR	+58	+51	+6	+5	-4
OCOR	+51	+45	+6	+5	-3
NH ₂	+29	+24	+11	+10	-5
NH ₃ ⁺	+26	+24	+8	+6	-5
NHR	+37	+31	+8	+6	-4
NR ₂	+42		+6		-3
NR ₃ ⁺	+31		+5		-7
NO ₂	+63	+57	+4	+4	
CN	+4	+1	+3	+3	-3
SH	+11	+11	+12	+11	-4
SR	+20		+7		-3
F	+68	+63	+9	+6	-4
Cl	+31	+32	+11	+10	-4
Br	+20	+25	+11	+10	-3
I	-6	+4	+11	+12	-1

Add these increments to the shift values of the appropriate carbon on in Table 5.2 or to the shift value calculated from Table 5.1.
 Source: Wehrli, F.W., Marchand, A.P., and Wehrli, S. (1983) *Interpretation of Carbon-13 NMR Spectra*, 2nd ed. London: Heyden.

Alkene and Cycloalkene Chemical Shifts (ppm from TMS)



M.B.PATEL SCIENCE COLLEGE, ANAND

First Internal Test - 2011-12

T.Y.B.Sc.

Chemistry: C - 302

Date : 18/10/2011

Day : Tuesday

Time : 3:00 P.M. To 4:30 P.M.

Total Marks : 40.

Note : Figures to the right indicates marks.

- Q.1(A) Answer the following : (ANY TWO) (06)**
- Explain Special isoprene rule. Why special isoprene rule is a guiding principle but not a fixed rule?
 - Nerol and Geraniol are geometrical isomer, how will you determine and confirmed their configuration?
 - How will you determine the position of double bond and tertiary alcoholic group in α - terpineol ?
 - Complete and re - write the following conversions with appropriate reagents.
 - Camphor $\xrightarrow{\quad ? \quad}$ Camphoric acid
 - Thy mol $\xrightarrow{\quad ? \quad}$ Menthol
 - α - Pinene $\xrightarrow{\quad ? \quad}$ Pinonic acid.
- (B) Answer the following : (ANY TWO) (04)**
- Draw the structure of Myrcene and Cadinene, also assigned them into head to tail carbon.
 - Give the importance of Tilden's reagent in terpenoid chemistry.
 - Discuss the Enfleurage method for isolation of essential oil.
 - Prove that linalool is closely related with geraniol.
- (C) Write the synthesis for the following : (ANYONE) (03)**
- Citral using Arens - Van - Drop's Synthesis.
 - α - terpineol using Perkin's synthesis.
- Q.2(A) Answer the following : (ANY TWO) (06)**
- What is Hoffmann's exhaustive methylation? Show how this process has been useful in elucidating the structure of alkaloids ?
 - Discuss the nature of side chain in Nicotine.
 - Prove that in Adrenaline the secondary alcoholic group is directly linked to the benzene ring.
 - Prove that, in Meroquinene the unsaturated side chain can not be allyl but vinyl side chain.
- (B) Answer the following : (ANY TWO) (04)**
- Discuss the method used for the estimation of methoxyl group in alkaloids.
 - How will you determine the presence of methylene group in papaverine ?
 - How would you convert : Adrenaline from Diacetyl protocatechuicaldehyde.
 - Complete and re write the following conversion and give the importance for structure determination of alkaloid.
$$\text{Quinine} \xrightarrow[\text{CrO}_3]{\text{(O)}} \text{Quininone}$$
- (C) Write the synthesis for the following : (ANY ONE) (03)**
- Spath and Bretschneider synthesis of Nicotine.
 - Wohl synthesis of Cincholongic acid.
- Q.3(A) Answer the following : (ANY TWO) (06)**
- Explain the term "Peptide." Discuss the geometry of the peptide linkage.
 - What are proteins ? Give a broad classification of proteins on the basis of their shape and also discuss their properties.
 - Discuss the mechanism of enzyme action of chymotrypsin.
 - Discuss the secondary structure of DNA.
- (B) Answer the following:(ANY TWO) (04)**
- Give the structure and name of essential heterocyclic amino acid.
 - Explain. In Zwitter ion ammonium group act as an acid and carboxylate group act as a base.
 - Discuss the Frederick - Sanger's method for N-terminal residue analysis.
 - Distinguish between : Collagen and Gelatin
- (C) Write the synthesis for the following : (ANY TWO) (04)**
- Phenylalanine using malonic ester synthesis.
 - Leucine using ethyliso valerate and ethyloxlate via reductive amination.
 - Aspartic acid using phthalimido malonic ester synthesis.
 - Ala - Val using benzylchloroformate.

Best of Luck

M. B. Patel Science College, ANAND.
First Internal Test - 2011.

T. Y. B. Sc.
Chemistry - C. 303.

Date: 19/10/2011

Time: 3 Pm to 4:30 Pm.

Total Marks: [40]

Q. 1 [A] Write any two.

- (i) Describe the extraction of Nickel by Mond's Process. What are its industrial applications.
- (ii) Give the name and formula of chief ores of Uranium. Describe the manufacture of uranium from carnotite.
- (iii) Give the principal types of furnaces used in extraction of metals? Describe the reverberatory furnace.
- (iv) Give the name various processes for extraction of silver. Describe the extraction of silver by cyanide process.

[B] Write any one

- (i) Write short notes on:
 - (a) Silvering of Mirrors
 - (b) White lead
- (ii) Give the comparison between Bessemer and open-Hearth furnace.

Q. 2 [A] Write any two

- (i) Describe the structure and bonding in Ferrocene
- (ii) Define the organo metallic compounds? Briefly discuss general methods of preparation organo-metallic compounds.

(ii) Give an account of organo-metallic compounds Aluminium.

(iv) Give an account of organo metallic compounds of alkaline earth metals.

[B] Write any one

(i) Give the Preparation, Properties and bonding in metal-olefin complexes.

(ii) Discuss the general properties of organo metallic compounds.

Q. 3 [A] Write any two

(i) What is S_N^2 Mechanism? Discuss its Mechanism, why it is known as association mechanism.

(ii) Discuss the mechanism of substitution reaction without breaking metal-ligand bond.

(iii) Discuss the acid hydrolysis reaction of six co-ordinated $Co(III)$ ammine complexes, along with the mechanism in detail.

(iv) Discuss the π -bonding theory of trans-effect.

[B] Write any one

(i) Discuss the potentiometric method (Bjerrum method) for determination of stability constant.

(ii) Discuss the effect of following factors on stability of Metal-complexes.

(a) Charge and size of the central Metal-ion

(b) chelate effect.

Best of Luck.

M. B. Patel Science College.

T. Y. B. Sc. Examination.

Chemistry: C-304

Frist Periodic Test 2011-12.

Thursday, 20th Oct. 2011.

Time : 3:00 to 4:30 pm

Total Marks : 40

Note: Figures to the right indicate full marks.

Que-1 Attempt any three.

[14]

- Define the term corrosion and discuss the different types of corrosion.
- Discuss how treatment of metal is useful for the prevention of corrosion.
- Define the term alloys. How are they classified? Give an account of substitutional alloy.
- Explain the term passivity. Discuss the oxide layer theory of passivity in detail.
- Discuss in detail of the fusion method for the preparation of the alloys.
- Give classification of alloys. Discuss non ferrous alloys with suitable examples.

Que-2 Attempt any three.

[13]

- What is isomerism? Discuss structural isomerism in detail.
- Discuss different types of stereo isomerism in 6- coordination compounds.
- Discuss Grinberg's method for the identification of cis and trans isomers.
- Discuss the nature of M-CO bonding in mononuclear carbonyls.
- Discuss the preparation and structure of $\text{Co}_2(\text{CO})_8$. (in solution)
- Discuss the general methods for the preparation of metal carbonyls.

Que-3 Attempt any three.

[13]

- Define inorganic polymer. Describe in detail the inorganic polymer containing boron in its backbone.
- Give the preparation, properties and structure of white graphite.
- Give different sources for the commercial production of CO_2 and discuss coke combustion method for the manufacture of CO_2 .
- Compare and contrast the chemical properties of organic benzene and inorganic benzene.
- What are inorganic polymers? Classify them on the bases of types of reactions by which they are produced?
- Discuss the manufacture of oxygen and nitrogen by Claude's process. Give the uses of nitrogen.

★ ***** ★
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M. B. Patel Science College, Anand

1st Periodic Test 2011-12

T. Y. B. Sc C-305

Date: 21-10-11

Time: 3:00pm to 4:30pm

Friday

Q-1. (a) Attempt any ONE (5)

- (i) State and explain Franck- Condon principle
- (ii) Discuss about intensities of spectral lines in rotational spectra.
- (iii) Discuss harmonic oscillator model for diatomic molecule.

Q-1. (b) Attempt any ONE (5)

- (i) Discuss the effect of isotopic substitution on rotational spectra.
- (ii) Write note on vibrational-rotational spectra.
- (iii) With suitable examples explain modes of vibration of atoms in polyatomic molecules.

Q-1. (c) Solve any ONE (4)

- (i) Calculate the fundamental frequency expected in IR spectroscopy of HBr stretching. The value of force constant is 4.12×10^5 dyne.cm⁻¹.
(Atomic weight of H=1.008gm/mole. Br=79.916gm/mole)
- (ii) The microwave spectrum of the CN radical shows a series of lines spaced by a nearly constant amount of 3.7978cm^{-1} . What is the bond length of CN?
(Atomic weight of C=12.011 and N=14.007gm/mole)

Q-2. (a) Attempt any ONE (5)

- (i) State different parts of instrument used to determine quantum yield and discuss first three parts in detailed.
- (ii) Explain the theory of Fluorescence and phosphorescence.
- (iii) What is photosensitizer? Discuss the mechanism of reactions sensitized by mercury atoms.

Q-2. (b) Attempt any ONE (4)

- (i) State and derive Lambert's law for absorption of radiation.
- (ii) Distinguish between dark and photochemical reaction.
- (iii) What is chemiluminescence? Give example of it.

Q-2. (c) Solve any ONE (4)

- (i) A solution of 1×10^{-3} M absorbs 10% of an incident radiation in a path of 1 cm length. What should be concentration of the solution in order to absorb 90% of the same radiation?
- (ii) A sample of gaseous HI was irradiated by light of wavelength 253.7 nm. 307 Joule of energy was found to decompose 1.3×10^{-3} mole of HI. Calculate the quantum yield for dissociation of HI.

Q-3. (a) Attempt any ONE (5)

- (i) What is Colloids? Distinguish between a molecular solution, a colloidal solution and coarse dispersion.
- (ii) Describe condensation method to prepare colloidal solution.
- (iii) Define zeta potential. Explain DLVO theory of stability of lyophilic colloids.

Q-3. (b) Attempt any ONE (4)

- (i) Distinguish between lyophilic sols and lyophobic sols.
- (ii) Explain the terms (1) Reversible sol (2) Ir-reversible sol
(3) Peptization (4) Gold number

Q-3. (c) Solve any ONE (4)

- (i) For coagulation of 200 ml of Arsenic sulphide sol, 2.5 ml of 1 M sodium chloride is required. What is the flocculation value of sodium chloride.
- (ii) The coagulation of 100 ml colloidal sol of gold is completely prevented by addition of 0.25 gm of starch to it before adding 1 ml of 10% sodium chloride solution. Find out the gold number of starch.

*****Best of Luck *****

M. B. PATEL SCIENCE COLLEGE , ANAND

THIRD YEAR B.Sc. (CHEMISTRY) C-306 FIRST PERIODIC TEST 2011-12

DATE : 22 / 10 / 2011

TIME : 3.00 PM TO 4.30 PM

TOTAL MARKS : 40

Q : 1

(A) Write any ONE from the followings. 5

(1) Write a short note on :

(i) Half-life Period

(ii) Mean life Period

(2) Write a short note on : Types of Radio active Decay

(B) Write any ONE from the followings. 5

(1) Prove that $A = A_0 e^{-\lambda t}$

(2) What do you mean by Nuclear Reaction ? Discuss Elastic and Inelastic scattering .

(C) Write any ONE from the followings. 4

(1) Write a short note on : (i) Nuclear Fusion Reaction

(ii) Nuclear Fission Reaction

(2) Define the terms : (i) Isotops (ii) Isobars

(iii) Isotones (iv) Isomers

Q : 2

(A) Write any ONE from the followings. 5

(1) Describe consecutive reaction in which both steps are of first order.

(2) What are the criteria of catalysis ? Discuss in details .

(B) Write any ONE from the followings. 4

(1) Explain the simple collision theory of reaction rate .Give also the reasons for its failure.

(2) Show that thermal decomposition of acetaldehyde is of 1.5 order.

(C) Write any ONE from the followings. 4

(1) What is period of Induction ? Discuss in detail giving suitable example .

(2) Write note on : The Activated Complex Theory.

Q : 3

(A) Write any ONE from the followings. 5

(1) What is Polarography ? Discuss the status of ILKOVIK equation in Polarography.

(2) Write a short note on : (i) The Migration Current
(ii) The kinetic and Catalytic Current

(B) Write any ONE from the followings. 4

(1) Discuss the Dropping Mercury Electrode used in Polarography .
What are its merits and demerits ?

(2) What is Half-wave potentials ? Deduce an expression for Half-wave potentials in Polarography.

(C) Solve any ONE from the followings. 4

(1) A drags gives a polarographic waves at $E_{1/2} = 0.265$ V SCE in 0.05 M H_2SO_4 solution. A 50 ml sample containing the drags gave a wave height of 37 μA .When 2 ml of 3 mM drags in 0.05 M H_2SO_4 was added to the sample. The wave height increase to 8.0 μA Find the molarity of the drags in the sample.

(2) 100 ml polarographic cell solution is prepared from 9 ml of 0.01 M Zn^{+2} and 10 ml of unknown Cd^{+2} solution .The corrected heights for first and second wave of polarogram were found to be 39.5 mm and 32 mm respectively. Calculate the concentration of Cd^{+2} solution.

Data for ion in cell :

<u>Ion</u>	<u>Id</u>	<u>$E_{1/2}$ v (-Vs- SCE)</u>
Cd^{+2}	3.51	- 0.60
Zn^{+2}	3.42	-1.00

☺ ALL THE BEST ☺