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### 3.3.2 Number of books and chapters in edited volumes/books published and papers published in national/ international conference proceedings per teacher during last five year

Sl. No	Name of the teacher	Title of the book/chapters published	Calendar Year of publication	ISBN number of the proceeding	Name of the publisher	web link
1	Dr.K.SUNDER KUMAR	SYNTHESIS AND ANTICANCER EVALUATION OF CARBAZOLE AND QUINOXALINES	2019	978-81-927089-7-3	LAMBERT ACADEMIC PUBLISHING	<a href="https://www.amazon.in/Synthesis-anticancer-evaluation-carbazole-quinoxalines/dp/6202023880">https://www.amazon.in/Synthesis-anticancer-evaluation-carbazole-quinoxalines/dp/6202023880</a>
2	Dr.K.SUNDER KUMAR	INORGANIC AND ORGANIC CHEMISTRY	2018	978-81-927089-6-6	SPECTRUM PUBLISHING	<a href="https://drive.google.com/file/d/1eH4hsJ1ebBUAisPXEISofaQ95wheDMv/view?usp=sharing">https://drive.google.com/file/d/1eH4hsJ1ebBUAisPXEISofaQ95wheDMv/view?usp=sharing</a>
3	Dr.K.SUNDER KUMAR	PHYSICAL AND GENERAL CHEMISTRY	2018	970-620-2-02388-7	SPECTRUM PUBLISHING	<a href="https://drive.google.com/file/d/1B2b9URnYnRAR_raQnjWShemMPwOF11KW/view?usp=sharing">https://drive.google.com/file/d/1B2b9URnYnRAR_raQnjWShemMPwOF11KW/view?usp=sharing</a>
4	Dr.K.V.L.MANAS A	WORK LIFE BALANCE AND JOB SATISFACTION	2018	978-93-87418-12-7	VRINDA PUBLICATIONS	<a href="https://isbn.gov.in/Home/SearchIsbnNew">https://isbn.gov.in/Home/SearchIsbnNew</a>
5	Dr.R.SREENIVAS A RAO	ELECTRONICS DEVICES AND CIRCUITS	2023	9789357579414	SCIENTIC INTERNATIONAL PUBLISHING HOUSE	<a href="https://dl.flipkart.com/s/Xy7wC9NNNN">https://dl.flipkart.com/s/Xy7wC9NNNN</a>
5	Dr.R.SREENIVAS A RAO	MODERN DIGITAL ELECTRONICS	2023	978-81-968621-90	RK PUBLISHING	<a href="https://doi.org/10.5281/zenodo.10531321">https://doi.org/10.5281/zenodo.10531321</a>

  
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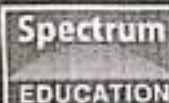
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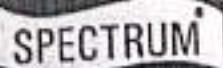
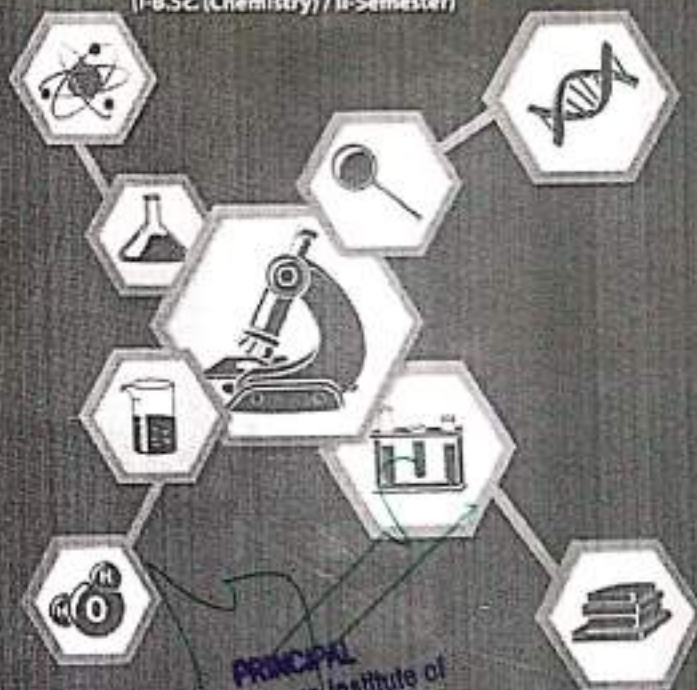
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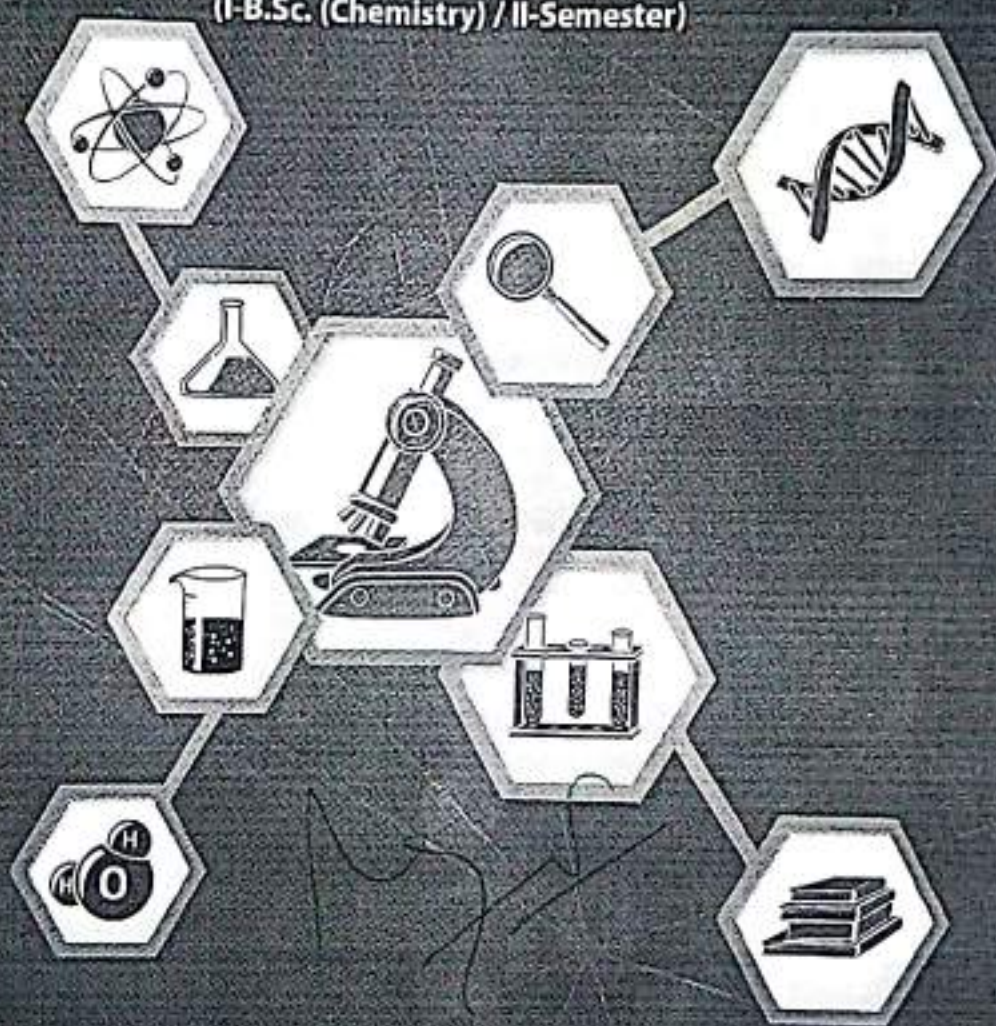
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# PHYSICAL AND GENERAL CHEMISTRY

I- B.Sc(Chemistry)/ II - Semester

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A handwritten signature in blue ink, appearing to read 'S. Palle'.

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B.Sc. (Chemistry) - Physical and General Chemistry

PHYSICAL CHEMISTRY

UNIT-I

1. **Solidstate:** Symmetry in crystals. Law of constancy of interfacial angles. The law of rationality of indices. The law of symmetry. Definition of lattice point, space lattice, unit cell. Bravais lattices and crystal systems. X-ray diffraction and crystal structure. Bragg's law. Defects in crystals. Stoichiometric and non-stoichiometric defects.

UNIT-II

1. **Gaseous State:** Compression factors, deviation of real gases from ideal behavior. Vander Waal's equation of state. P-V Isotherms of real gases, Andrew's isotherms of carbon dioxide, continuity of state. Critical phenomena. The vander Waal's equation and the critical state. Law of corresponding states. Relationship between critical constants and vander Waal's constants. Joule Thomson effect.
2. **Liquid State:** Structural differences between solids, liquids and gases. Liquid crystals, the mesomorphic state. Classification of liquid crystals into Smectic and Nematic. Differences between liquid crystal and solid/liquid. Application of liquid crystals as LCD devices.

UNIT-III

3. **Solutions:** Liquid-liquid - ideal solutions, Raoult's law. Ideally dilute solutions, Henry's law. Non-ideal solutions. Vapour pressure - composition and vapour pressure- temperature curves. Azeotropes-HCl-H<sub>2</sub>O, ethanol-water systems and fractional distillation. Partially miscible liquids-phenol-water, trimethylamine-water, nicotine-water systems. Effect of impurity on consolute temperature. Immiscible liquids and steam distillation. Nernst distribution law. Calculation of the partition coefficient. Applications of distribution law.

GENERAL CHEMISTRY

UNIT-IV

1. **Surface Chemistry:** Definition of colloids. Solids in liquids (sols), preparation, purification, properties - kinetic, optical, electrical. Stability of colloids, Hardy-Schulze law, protective colloid. Liquids in liquids (emulsions) preparation, properties, uses. Liquids in solids (gels) preparation, uses. Adsorption: Physical adsorption, chemisorption. Freundlich, Langmuir adsorption isotherms. Applications of adsorption
2. **Chemical Bonding:** Valence bond theory, hybridization, VB theory as applied to  $\text{ClF}_3$ ,  $\text{Ni}(\text{CO})_4$ , Molecular orbital theory - LCAO method, construction of M.O. diagrams for homo-nuclear and hetero-nuclear diatomic molecules ( $\text{N}_2$ ,  $\text{O}_2$ , CO and NO).

UNIT-V

1. **Stereochemistry of Carbon Compounds:** Molecular representations- Wedge, Fischer, Newman and Saw-Horse formulae. Optical isomerism: Optical activity- wave nature of light, plane polarised light, optical rotation and specific rotation. Chiral molecules- definition and criteria (Symmetry elements)- Definition of enantiomers and diastereomers - Explanation of optical isomerism with examples Glyceraldehyde, Lactic acid, Alanine, Tartaric acid, 2,3-dibromopentane. D,L and R,S configuration methods and E,Z- configuration with examples.



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# Detailed Contents

## Physical and General Chemistry

### Chapter-1

1.0	Aims and Objectives	1
1.1	Introduction	1
1.2	Symmetry in Crystals	2
1.3	Laws of Crystallography	4
1.4	Lattice Point, Space Lattice and Unit Cell	4
1.5	Bravis Lattices and Crystal Systems	5
1.6	X- ray Diffraction and Crystal Structure	10
1.7	Bragg's law	11
1.7.1	Determination of Crystal Structure by Bragg's Method	12
1.7.2	Determination of Crystal Structure by Powder Method	12
1.8	Indexing of Planes and Structures NaCl and NaI Crystals	15
1.9	Defects in Crystals, Stoichiometric and Non-stoichiometric	16
1.10	Valence Band Theory of Semiconductors	22
1.11	Summary	29
1.12	Exercise	30
1.13	Objective Type Questions	32

### Chapter-2

2.0	Aims and Objectives	33
2.1	Introduction	33
2.2	Real Gases from Ideal Behavior	35
2.3	Vander Waal's Equation of State	36
2.4	P-V Isotherms of Real Gases	38
2.4.1	Andrew's Isotherms of Carbon-dioxide, Continuity of State	40
2.5	Critical Phenomena, the Vander Waal's equation and the Critical State	41
2.5.1	Relationship between Critical Constants and Vander Waal's Constants	43
2.6	The Law of Corresponding States and Reduced Equation States	46
2.7	Joule Thomson Effect	48
2.8	Liquefaction of Gases: Linde's and Claude's Methods	50
2.9	Summary	51
2.10	Exercise	52
2.11	Objective Type Questions	53

	<b>Chapter-3</b>	
3.0	Aims and Objectives	55
3.1	Introduction	55
3.2	Intermolecular Forces	56
	3.2.1 Structure of Liquids	58
3.3	Solids, Liquids and Gases	59
3.4	Liquid Crystals and The Mesomorphic State	61
3.5	Classification of Liquid Crystals	62
3.6	Liquid Crystal and Solid/liquid	62
3.7	Liquid Crystals as LCD Devices	63
3.8	Summary	63
3.9	Exercise	64
3.10	Objective Type Questions	64

	<b>Chapter-4</b>	
4.0	Aims and Objectives	67
4.1	Introduction	67
4.2	Liquid-liquid Solutions	68
4.3	Ideal and non Ideal Solutions	69
4.4	Raoult's Law	70
4.5	Ideally Dilute Solutions	71
4.6	Henry's Law	72
4.7	Vapour Pressure Composition and Vapour Pressure Temperature Curve	77
4.8	Azeotropes- HCl - H <sub>2</sub> O	78
4.9	Ethanol-water System and Fractional Distillation	79
4.10	Partially Missible Liquids Systems	81
4.11	Effect of Impurity on Consulated Temperature	83
4.12	Immissible Liquids and Steam Distillation	84
4.13	Nernst Distribution Law	85
4.14	Summary	88
4.15	Exercise	89
4.16	Objective Type Questions	91

	<b>Chapter-5</b>	
5.0	Aims and Objectives	95
5.1	Introduction	95
5.2	Definition of Colloids	97
5.3	Solids in Liquids (sols)	97
5.4	Different Properties of Colloids	101
5.5	Stability of Colloids, Hardy - Schulze Law	103
5.6	Protective Colloid	104

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5.7	Liquid-liquid (emulsions)	105
5.8	Liquids in Solids(gels)	106
5.9	Adsorption	106
5.10	Freundlich, Langmuir Adsorption	108
5.11	Summary	110
5.12	Exercise	111
5.13	Objective Type Questions	112
<b>Chapter-6</b>		
6.0	Aims and Objectives	115
6.1	Introduction	115
6.2	Valence Bond Theory	116
6.3	Hybridization	120
6.4	VB Theory as Applied to $\text{ClF}_3$ , $\text{BrF}_3$ , $\text{Ni}(\text{CO})_4$ , $\text{XeF}_2$	122
6.5	Dipole Moment Electric Field	123
	6.5.1 Dipole Moment, Induced Dipole Moment	125
6.6	Molecular Orbital Theory LCAO Method	126
6.7	Summary	127
6.8	Exercise	128
6.9	Objective Type Questions	129
<b>Chapter-7</b>		
7.0	Aims and Objectives	131
7.1	Introduction	131
7.2	Molecular Representations and Different Formula	133
7.3	Stereoisomerism	139
7.4	Conformational and Configurational Isomerisms	141
7.5	Enantiomers	143
7.6	Chiral Molecules	146
	7.6.1 Asymmetric and Diastereomeric Molecules	147
7.7	Chiral Centers	149
7.8	Mesomers (2, 3-dichloropentane)	150
7.9	Number of Enantiomers and Mesomers Calculation	152
7.10	D.L and R.S Configuration for Asymmetric and Disymmetric Molecules	154
7.11	Cahn-Ingold-prelog Rule	156
7.12	Racemic Mixture, Racemisation and Resolution Techniques	158
7.13	Diastereomers	160
7.14	E-Z Configuration	162
7.15	Summary	163
7.16	Exercise	163
7.17	Objective Type Questions	165

# Inorganic & Organic Chemistry

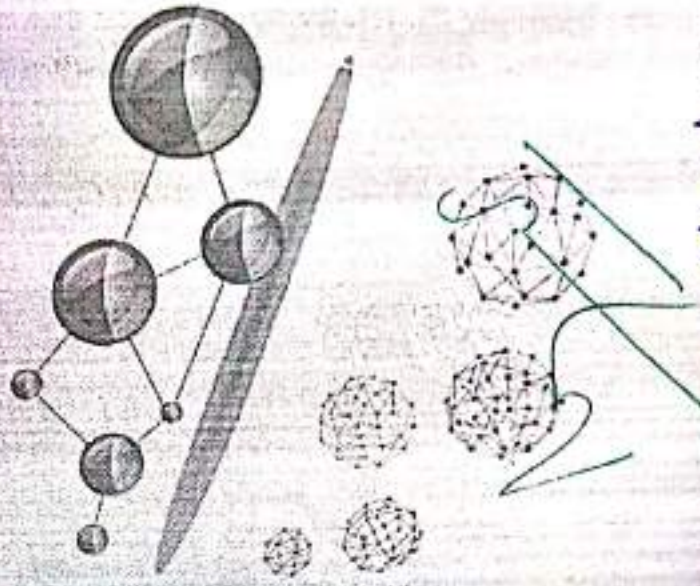
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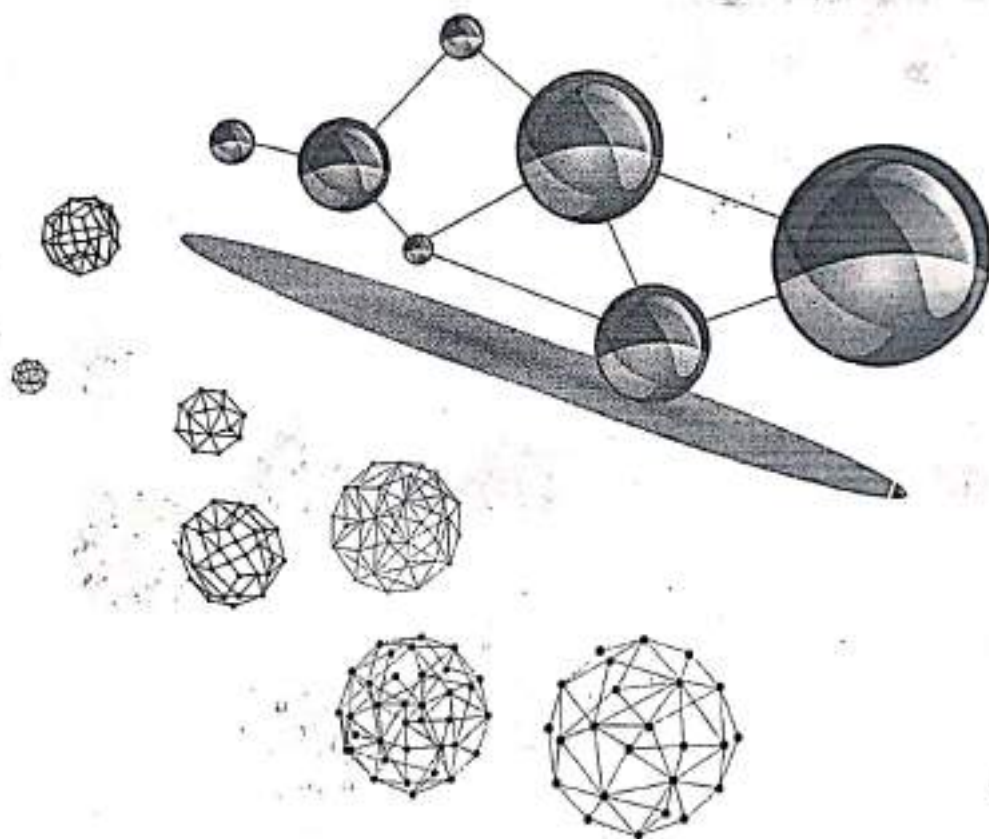
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iii

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**I<sup>st</sup> Year / I<sup>st</sup> Semester as per CBCS**  
**B.Sc. (Chemistry) - Inorganic and Organic Chemistry**

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**INORGANIC CHEMISTRY**

**UNIT -I**

**1. P-block elements-I**

Group-13: Synthesis and structure of diborane and higher boranes

( $B_4H_{10}$  and  $B_5H_9$ ), boron-nitrogen compounds ( $B_3N_3H_6$  and BN)

Group - 14: Preparation and applications of silanes and silicones.

Group - 15: Preparation and reactions of hydrazine, hydroxylamine.

**UNIT-II**

**1. P-block elements -II**

Group - 16: Classifications of oxides based on (i) Chemical behaviour and

(ii) Oxygen content.

Group-17: Inter halogen compounds and pseudo halogens.

**2. Organometallic Chemistry**

Definition - classification of Organometallic compounds - nomenclature, preparation, properties and applications of alkyls of Li and Mg.

**ORGANIC CHEMISTRY**

**UNIT-III**

**1. Structural theory in Organic Chemistry**

Types of bond fission and organic reagents (Electrophilic, Nucleophilic, and free radical reagents including neutral molecules like  $H_2O$ ,  $NH_3$ , &  $AlCl_3$ ).

Bond polarization : Factors influencing the polarization of covalent bonds, electro negativity - inductive effect. Application of inductive effect (a) Basicity of amines (b) Acidity of carboxylic acids (c) Stability of carbonium ions. Resonance or Mesomeric effect, application to (a) acidity of phenol, and (b) acidity of carboxylic acids. Hyper conjugation and its application to stability of carbonium ions, Free radicals and alkenes, carbanions, carbenes and nitrenes.

Types of Organic reactions : Addition - electrophilic, nucleophilic and free radical. Substitution - electrophilic, nucleophilic and free radical. Elimination- Examples.

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## UNIT-IV

### 5. Acyclic Hydrocarbons

Alkenes - Preparation of alkenes. Properties: Addition of hydrogen - heat of hydrogenation and stability of alkenes. Addition of halogen and its mechanism. Addition of HX, Markonikov's rule, addition of  $H_2O$ , HOX,  $H_2SO_4$  with mechanism and addition of HBr in the presence of peroxide (anti - Markonikov's addition). Dienes - Types of dienes, reactions of conjugated dienes - 1,2 and 1,4 addition of HBr to 1,3 - butadiene and Diel's - Alder reaction.

Alkynes - Preparation by dehydrohalogenation of dihalides, dehalogenation of tetrahalides. Properties: Acidity of acetylenic hydrogen (formation of Metal acetylides). Preparation of higher acetylenes, Metal ammonia reductions, Physical properties. Chemical reactivity - electrophilic addition of  $X_2$ , HX,  $H_2O$  (Tautomerism), Oxidation with  $KMnO_4$ ,  $OsO_4$ , reduction and Polymerisation reaction of acetylene.

### 6. Alicyclic hydrocarbons (Cycloalkanes)

Nomenclature, Preparation by Freund's method, Wislicenus method. Properties - reactivity of cyclopropane and cyclobutane by comparing with alkanes, Stability of cycloalkanes - Baeyer's strain theory, Sachse and Mohr predictions and Pitzer's strain theory. Conformational structures of cyclobutane, cyclopentane, cyclohexane.

## UNIT-V

### 1. Benzene and its reactivity

Concept of resonance, resonance energy. Heat of hydrogenation, heat of combustion of Benzene, mention of C-C bond lengths and orbital picture of Benzene. Concept of aromaticity - aromaticity (definition), Huckel's rule - application to Benzenoid (Benzene, Naphthalene) and Non - Benzenoid compounds (cyclopropenyl cation, cyclopentadienyl anion and tropylium cation) Reactions - General mechanism of electrophilic substitution, mechanism of nitration, Friedel Craft's alkylation and acylation. Orientation of aromatic substitution - Definition of ortho, para and meta directing groups. Ring activating and deactivating groups with examples (Electronic interpretation of various groups like  $NO_2$  and Phenolic). Orientation of (i) Amino, methoxy and methyl groups (ii) Carboxy, nitro, nitrile, carbonyl and sulphonic acid groups (iii) Halogens (Explanation by taking minimum of one example from each type)



# Detailed Contents

## Inorganic and Organic Chemistry

<b>Chapter-1</b>		
1.0	Aims and Objectives	1
1.1	Introduction	1
1.2	S-block Elements	3
1.3	Diagonal Relationship between Li and Mg	7
1.4	Diagonal Relationship Between Be & Al	9
1.5	Group-13: Synthesis of Diborane	11
1.6	Group-14: Silanes and Silicones	15
1.7	Group-15: Hydrazine	18
1.8	Preparation and Reaction of Hydroxylamine and Phosphazenes	19
1.9	Summary	20
1.10	Exercise	20
1.11	Objective Type Questions	22
<b>Chapter-2</b>		
2.0	Aims and Objectives	25
2.1	Introduction	25
2.2	Group-16: Classifications of Oxides	26
2.3	Group-17 Interhalogen Compounds and Pseudo Halogens	27
2.4	Definition and classification Organometallic Compo-unds	32
2.5	Nomenclature, Preparation and Properties	34
2.6	Applications of Alkyls of 1, 2 and 13 group Elements	36
2.7	Summary	37
2.8	Exercise	39
2.9	Objective Types Questions	40
<b>Chapter-3</b>		
3.0	Aims and Objectives	45
3.1	Introduction	45
3.2	Types of Bond Fission and Organic Reagents	45
3.3	Bond Polarization	48
3.4	Electronegativity - Inductive Effect	48
3.5	Applications of Inductive Effect	50
3.6	Resonance or Mesomeric Effect	53
3.7	Hyper Conjugation and its application to stability of carboniumions	57
3.8	Free Radicals and Alkanes, Carbanions, CarbinEs, Nitranes	58
3.9	Types of Organic Reactions	59
3.10	Elimination	61
3.11	Summary	62
3.12	Exercise	63
3.13	Objective Type Questions	65
<b>Chapter-4</b>		
4.0	Aims and Objectives	69
4.1	Introduction	69
4.2	Alkanes	70

  
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4.3	Hydrogenation of Alkynes and Alkenes	72
4.4	Chemical Reactivity	74
4.5	Halogenation	75
4.6	Alkenes	75
4.7	Addition of Hydrogen	78
4.8	Addition of Halogen and its Mechanism	80
4.9	Oxidation	84
4.10	Dienes	85
4.11	Alkynes	95
4.12	Acidity of Acetylenic Hydrogen	97
4.13	Higher Acetylene, Metal Ammonia Reductions	97
4.14	Chemical Reactivity	98
4.15	Oxidation	100
4.16	Reduction and Polymerisation Reaction of Acetylene	102
4.17	Summary	102
4.18	Exercise	103
4.19	Objective Type Questions	104

**Chapter-5**

5.0	Aims and Objectives	109
5.1	Introduction	109
5.2	Nomenclature	109
5.3	Preparation of cycloalkanes methods	110
5.4	Heating Dicarboxylic Metal Salt	111
5.5	Reactivity of Cyclopropane, Cyclobutane	111
5.6	Stability of Cycloalkanes	112
5.7	Sachse and Mohr Prediction and Pitzer's Strain Theory	114
5.8	Conformational Structures	114
5.9	Summary	116
5.10	Exercise	117
5.11	Objective Type Questions	118

**Chapter-6**

6.0	Aims and Objectives	121
6.1	Introduction	121
6.2	Resonance, Resonance Energy	121
6.3	Hydrogenation	122
6.4	Heat of Combustion of Benzene	123
6.5	Mention of C-C, Bond Lengths and Orbital Picture of Benzene	123
6.6	Aromaticity	125
6.7	Huckel's rule	125
6.8	General Mechanism of Electrophilic Substitution	130
6.9	Friedel Craft's Alkylation and Acylation	131
6.10	Orientation of Aromatic Substitution	133
6.11	Orientation of Amino, Methoxy and Methyl Groups	134
6.12	Summary	137
6.13	Exercise	137
6.14	Objective Type Questions	139

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The design and synthesis for different biological properties such as anticancer, apoptosis and PDE4 inhibition using new methodologies uncovering the early stage of drug discovery. Biological targeting apoptosis is an organized suicide program that begins when the mitochondria break down releasing cytochrome 'c' into the cytoplasm. The cell shrinks and develops blebs on its surface. The cytoskeleton is destroyed and nuclear DNA is degraded. Ultimately, the cell breaks apart into membrane-wrapped cellular fragments called apoptotic bodies. The apoptotic bodies are engulfed by macrophages and subsequently removed from the tissue without leading to an inflammatory response. In view of their observed pharmacological properties and the fact that most cytotoxic anticancer agents are known to induce apoptosis the present class of PDE4 inhibitors seemed to have potential medicinal value. Although PDE4 is a focal target for inflammatory related diseases the dose limiting side effects of the PDE4 inhibitors. These research works are presented in five chapters of this book. We presented the particular biological targets of our interest, known chemical entities for those targets.

Synthesis and Anticancer Evaluation of Carbazole and Quinoxalines



Koli Sunder Kumar



Dr. K. Sunder Kumar received his B.Sc degree from Osmania University (2000-2003). He obtained his M.Sc. Chemistry from St. Johan's College, Agra in 2007. He obtained Ph.D in Medicinal Organic Chemistry from Acharya Nagarjuna University, Guntur in the year 2015. He received young faculty award from Venus International Foundation, Chennai in 2016.



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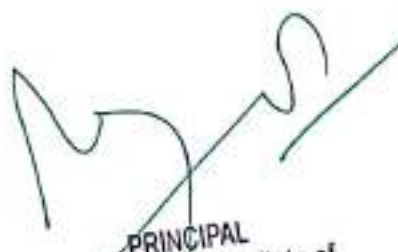
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Kolli Sunder Kumar

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of carbazole and quinoxalines**



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# CONTENTS

<b>CHAPTER - 1</b>	<b>1-27</b>
1.1 : Drug discovery	1
1.2 : Cancer	3
1.2.1 : Acylation reactions	6
1.3 : Apoptosis	7
1.3.1 : Cell death and apoptosis	8
1.4 : Phosphodiesterases 4 (PDE4) inhibitors	9
1.4.1 : Zebrafish as <i>in vivo</i> Model	11
1.4.2 : Sonogashira coupling reaction	12
1.4.3 : Buchwald–Hartwig amination reaction	16
1.4.4 : Iodine-Mediated cyclization of tethered heteroatom	19
1.5 : Conclusions	22
1.6 : References	23
<b>CHAPTER - 2</b>	<b>28-61</b>
2.1 : Introduction	28
2.2 : Previous work	29
2.3 : Present work	32
2.4 : Results and Discussion	
2.4.1 : Reaction optimization conditions	33
2.4.2 : Scope of the work	35
2.4.3 : Reaction mechanism	38
2.4.4 : Application of methodology	39

  
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Pondicherry

2.5 : Pharmacology	40
2.6 : Experimental section	
2.6.1 : Chemistry	43
2.6.2 : Pharmacology	59
2.7 : Conclusion	60
2.8 : References	61
<b>CHAPTER - 3</b>	<b>66-105</b>
3.1 : Introduction	66
3.2 : Previous work	68
3.3 : Present work	70
3.4 : Results and Discussion	
3.4.1 : Preparation of starting materials	71
3.4.2 : Reaction optimization conditions	75
3.4.3 : Scope of the work	79
3.5 : Pharmacology	
3.5.1 : <i>In vivo</i> studies in Zebrafish embryo	80
3.5.2 : Toxicity studies in Zebrafish embryo ( <i>in vivo</i> )	81
3.6 : Experimental section	
3.6.1 : Chemistry	85
3.6.2 : Single crystal X-ray data	99
3.6.3 : Zebrafish embryo toxicity studies	100
3.7 : Conclusion	102
3.8 : References	103

**CHAPTER - 4**

Summary

106-107

106

  
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 Aodulapurmet (M), R.R. Dist. HYD. 518

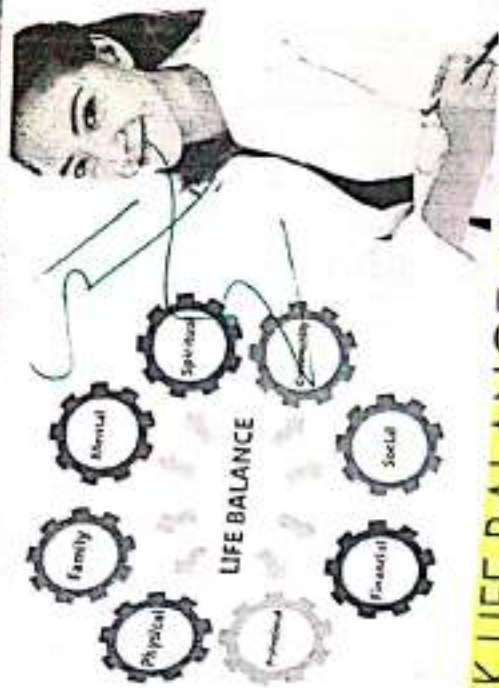


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# CONTENTS

Foreword	vii
Preface	viii
Acknowledgements	ix
List of Tables	xi

Chapter	Title	Page No.
I	Introduction	1-32
II	Work Life Balance of Women Employees in India - An Overview	33-74
III	Personal and Family Factors affecting Work Life Balance of Women Employees	75-105
IV	Organizational Work Practices affecting Work Life Balance of Women Employees	106-141
V	Work Life Balance and Job Satisfaction of Women Employees	142-160
VI	Summary, Conclusions and Suggestions	161-188
Bibliography		189-192

No.	Page No.
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9
10	10
11	11
12	12
13	13
14	14
15	15
16	16
17	17
18	18
19	19
20	20
21	21
22	22
23	23
24	24
25	25
26	26
27	27
28	28
29	29
30	30
31	31
32	32
33	33
34	34
35	35
36	36
37	37
38	38
39	39
40	40
41	41
42	42
43	43
44	44
45	45
46	46
47	47
48	48
49	49
50	50
51	51
52	52
53	53
54	54
55	55
56	56
57	57
58	58
59	59
60	60
61	61
62	62
63	63
64	64
65	65
66	66
67	67
68	68
69	69
70	70
71	71
72	72
73	73
74	74
75	75
76	76
77	77
78	78
79	79
80	80
81	81
82	82
83	83
84	84
85	85
86	86
87	87
88	88
89	89
90	90
91	91
92	92
93	93
94	94
95	95
96	96
97	97
98	98
99	99
100	100
101	101
102	102
103	103
104	104
105	105
106	106
107	107
108	108
109	109
110	110
111	111
112	112
113	113
114	114
115	115
116	116
117	117
118	118
119	119
120	120
121	121
122	122
123	123
124	124
125	125
126	126
127	127
128	128
129	129
130	130
131	131
132	132
133	133
134	134
135	135
136	136
137	137
138	138
139	139
140	140
141	141
142	142
143	143
144	144
145	145
146	146
147	147
148	148
149	149
150	150
151	151
152	152
153	153
154	154
155	155
156	156
157	157
158	158
159	159
160	160
161	161
162	162
163	163
164	164
165	165
166	166
167	167
168	168
169	169
170	170
171	171
172	172
173	173
174	174
175	175
176	176
177	177
178	178
179	179
180	180
181	181
182	182
183	183
184	184
185	185
186	186
187	187
188	188
189	189
190	190
191	191
192	192
193	193
194	194
195	195
196	196
197	197
198	198
199	199
200	200

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 Rajamahendravaram, Andhra Pradesh - 522 202

# LIST OF TABLES

Table No.	Title of the Table	Page No
2.1	Direct Employment in IT Industry in India	16
2.2	Share of Exports and Domestic Market in Total IT Revenues	17
2.3	Share of various sectors in total IT Revenue in India	19
2.4	Structure of IT Export from India	30
2.5	Pattern and Structure of Domestic IT Market in India	51
2.6	Destination of Indian Software Exports	53
2.7	Composition of Indian Software Development and Services (Domestic and Exports)	57
2.8	Revenue Distribution of NASSCOM Member Firms by Geographic Region	54
2.9	Industries served by Indian Software Exporters	55
2.10	Major Problems of Indian Software Firms	55
2.11	Domestic, International and Total Revenue of TCS during 2005-2013	60
2.12	Revenue of TCS by Geography Segments during 2005-2013	61
2.13	Profitability of TCS during 2005-2013	62
2.14	Business Segment-wise Revenues of TCS	63
2.15	Employee base of TCS during 2005 - 2013	64
2.16	Recruitment of Employees by TCS during 2014	64
2.17	Gender-wise Distribution of Employees of TCS	65
2.18	Important Financial Ratios of Infosys during 2010-2015	71
2.19	Important Growth Ratios of Infosys during 2010-2015	72
2.20	Business Segment-wise Revenues of Infosys during 2010 -2014	73
2.21	Geography Segment-wise Revenues of Infosys during 2010-2014	74
3.1	Age wise Distribution of Women Employees of Select IT Companies	76
3.2	Education Background of Women Employees	77
3.3	Goal of Education of Women Employees	78
3.4	Occupational Background of Women Employees	79
3.5	Cadre-wise Distribution of Sample Women Employees	80
3.6	Experience of Sample Women Employees	81
3.7	Monthly Emoluments of Sample Respondents	82
3.8	Family Profile of Sample Women Employees	83
3.9	Children's Age of Women Employees	84
3.10	Reasons for Taking up the Employment by Sample Women Employees	85

# Modern DIGITAL ELECTRONICS



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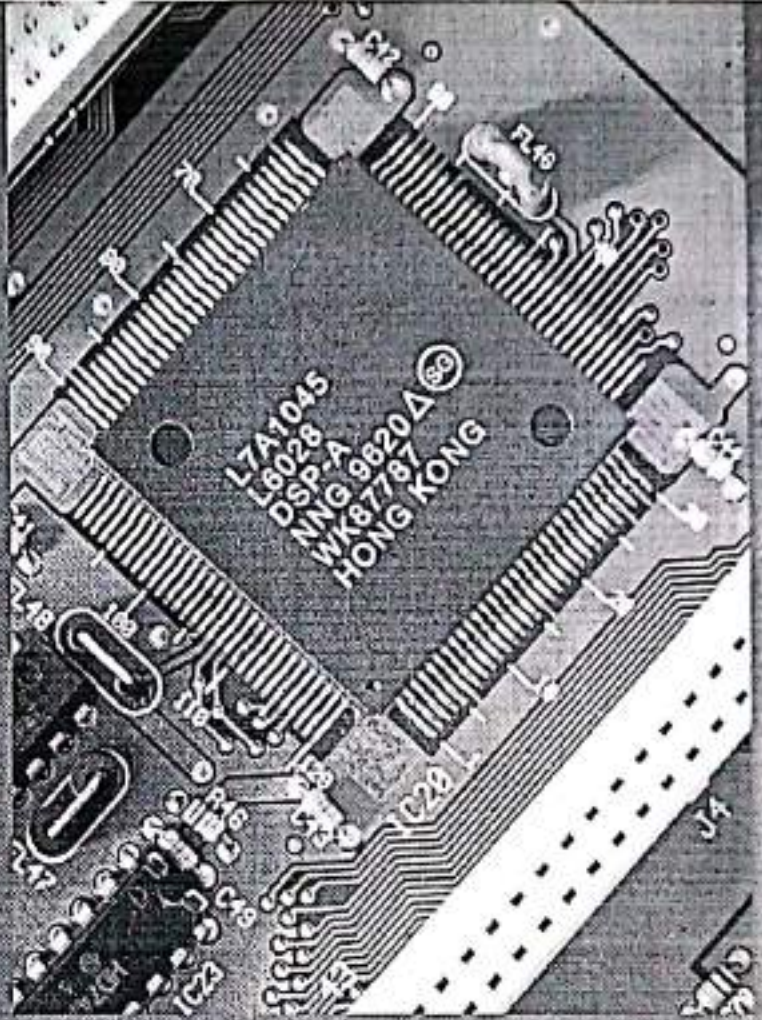
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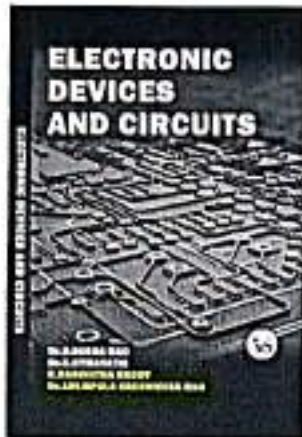
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