

PHYSICAL AND GENERAL CHEMISTRY

Dr. K. Sunder Kumar
Dr. Sadanandam Pale

23

B.A. (EM / TM)

B.Com. (EM / TM)

- Indian History and Culture (From Earliest times to 1526 A.D.)
- Indian History and Culture (From 1526 A.D. to 1964 A.D.)
- History of Modern World (1453-1964 A.D.)
- History and Culture of Andhra Pradesh (From Satavahanas to 2014)
- Micro Economics - I & II
- Macro Economics - I & II
- Indian Economy - I & II
- Public Finance & International Economics
- Political Science: Concepts, Theories and Institutions
- Basic Concepts of Political Science
- Concepts, Theories and Institutions
- Indian Government and Politics
- Indian Government - Institutions
- Political Thought
- Theories and Principles of Public Administration

- Financial Administration India
- Indian Administration - Emerging Issues
- Management of Resources
- Office Management
- Rural and Urban Government in India
- Basic Concepts in Sociology
- Society, Culture and Social Change
- Methods in Research
- Indian Society

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- Basics of Marketing
- Business Economics
- Management Process
- Organization Behaviour
- Business Law
- Quantitative Methods for Managers
- Accounting for Managers
- Business Environment

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- Business Organization
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- Business Statistics - I
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- Entrepreneurial Development & Business Ethics
- Corporate Accounting
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- Business Laws
- Accounting for Service Organizations
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- Mechanics & Properties of Matter
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- Physical & General Chemistry - II
- Spectroscopy and Physical Chemistry - IV
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- Medicinal Chemistry
- Green Chemistry & Pesticides
- Differential Equations
- Solid Geometry

- Abstract Algebra
- Real Analysis
- Linear Algebra
- Ring Theory & Vector Calculus
- Number Theory
- Numerical Analysis
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- Biology of Chordates - II
- Cell Biology, Genetics and Evolution
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- Developmental Biology, Genetics
- Animal Physiology
- Clinical Immunology & Techniques
- Applied Zoology
- Molecular Biology, Bio Chemistry
- Public Health, Reproductive Health

- Diversity of Micro and Lower Plants
- Diversity of Archaeopteryx & Anomali
- Bryophyta, Pteridophyta, Gymnosperms & Palaeobotany
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- Developmental & Medicinal Botany
- Genetics, Biodiversity & Conservation
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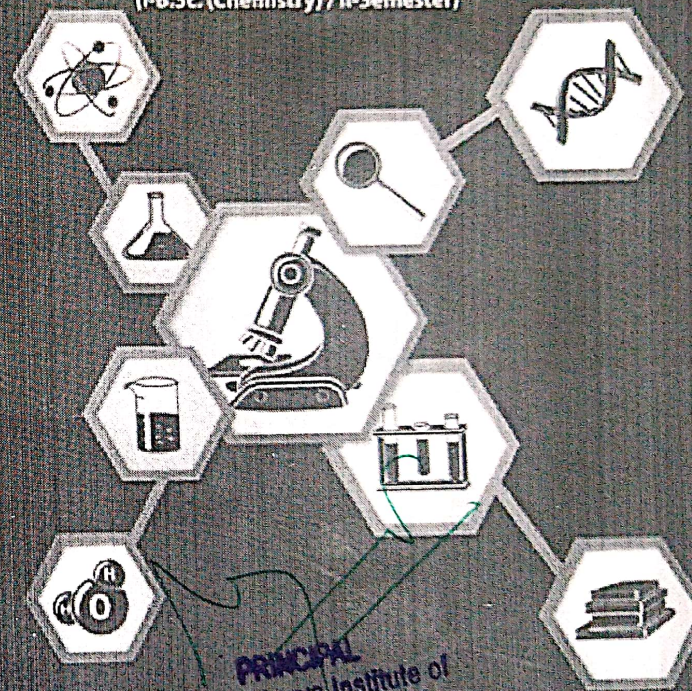


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PHYSICAL AND GENERAL CHEMISTRY

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



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Dr. K. Sunder Kumar
Dr. Sadanandam Pale

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



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PHYSICAL AND GENERAL CHEMISTRY

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

As per Choice Based Credit System (CBCS)

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CCST, IST, JNTUH, Hyderabad



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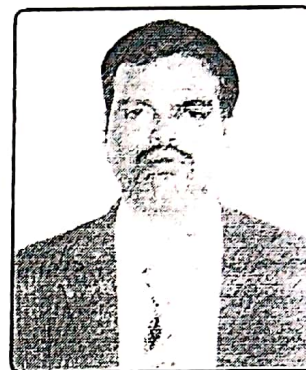
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He was awarded "**Young Faculty award in Chemical Science**" by Venus International Foundation and also award in **Young Scientist** by Educationexpo.tv, Kolkata. He has BOS in TKR college of Engineering & Technology (Autonomous). He published book on "Synthesis and anticancer evaluation of carbazole and quinoxalines" in Lambert publication (2017) and BS Publication (2010). He is the convenor of National Seminar on "Engineering Trends and Advances in Chemical Sciences (NSETACS-2016)". He is an Editorial board member of World Journal of Chemistry and Chemical processes, International Journal of Chemistry, Pharmacy & Technology and World Journal of Chemistry and Chemical Processes. He is also an Advisory board member of World Journal of Pharmacy and Pharmaceutical Sciences, World Pharmacy and Research and European Journal Pharmaceutical and Medical Research. He is the Fellow Membership of Association of Chemistry Teachers, Indian Science Congress Association, Indian Chemical Society and Society of biological Chemists. He has 10 years teaching experience and 7 years research industry experience. Since 2015 he has been working as an Associate Professor of chemistry in Annamacharya Institute of Technology & Sciences Affiliated to Jawaharlal Nehru Technological University Hyderabad.

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iii



Ist Year / IInd Semester as per CBCS
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-H₂O, 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 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 (N_2 , 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 NCl 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

	Chapter-3	
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

	Chapter-4	
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 ₂ 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

	Chapter-5	
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

Chapter-6

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 ClF_3 , BrF_3 , $Ni(CO)_4$, 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

Chapter-7

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

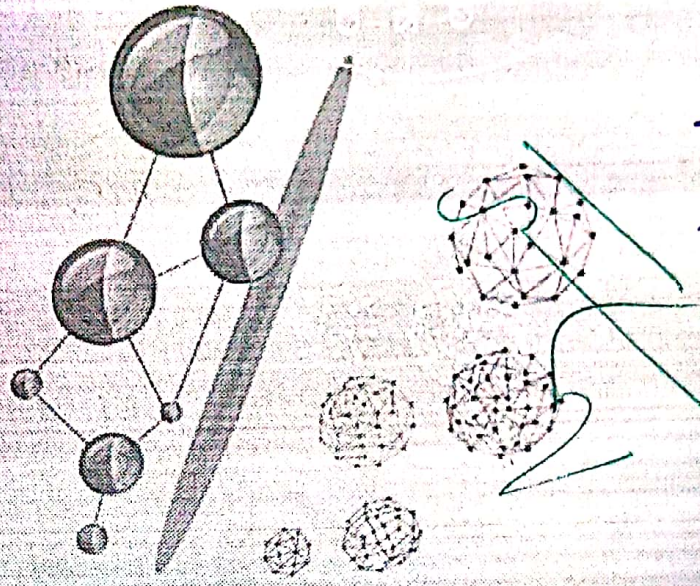
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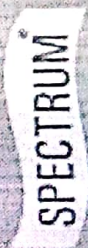


Inorganic & Organic Chemistry

B.Sc. (Chemistry) (3 Semesters)



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Inorganic & Organic Chemistry

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- Managerial Economics
- Principles of Accounting - II
- Principles of Management
- Foreign Trade
- Business Development
- Advanced Accounting
- Business Statistics - I
- Business Theory & Practice
- Employment Development & Business Ethics
- Corporate Accounting
- Business Statistics - II
- Income Tax - I & II
- Auditing
- Business Law I
- Accounting for Service Organizations
- Leadership Education
- Cost Accounting
- Computer Accounting
- Financial Statement Analysis

BBM

- Principles of Management
- Basics of Marketing
- Business Economics
- Management Process
- Organization Behaviour
- Business Law
- Quantitative Methods for Managers
- Accounting for Managers
- Business Environment

B.A. (EM / TM)

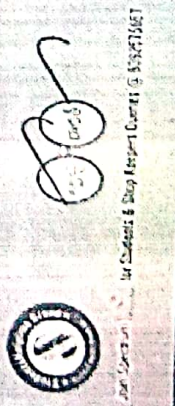
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- Indian History and Culture from 1526 A.D. to 1947 A.D.
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- Concepts Theories and Institutions
- Indian Government and Politics
- Indian Government - Institutions
- Political Thought
- Theories and Principles of Public Administration

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- Physical & General Chemistry - II
- Spectroscopy and Physical Chemistry - IV
- Inorganic, Physical & Organic Chemistry - V
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- Medical Chemistry
- Green Chemistry & Pesticides
- Differential Equations
- Solid Geometry
- Abstract Algebra
- Real Analysis
- Linear Algebra
- Ring Theory & Vector Calculus
- Number Theory
- Numerical Analysis
- Biology of Man - Chemistry - I
- Biology of Diatoms - I
- Cell Biology, Genetics and Evolutions
- Embryology, Physiology and Ecology
- Developmental Biology - Genetics
- Animal Physiology
- General Immunology & Techniques
- Applied Zoology
- Molecular Biology, Bio Chemistry
- Public Health, Reproductive health
- Diversity of Mammals and Lower Plants
- Diversity of Archaeopteryx & Aviculture
- Synovial, Pseudosynovial, Gymnosperms & Psittacology
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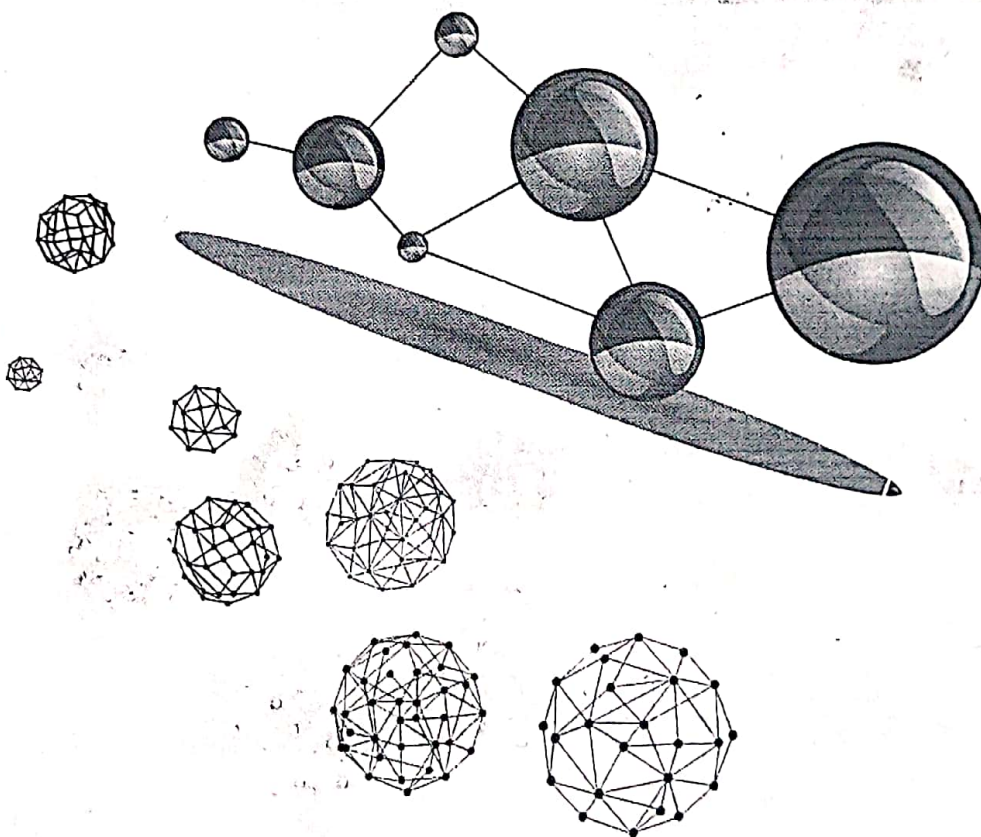
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INORGANIC AND ORGANIC CHEMISTRY

B.Sc (Chemistry)/ I - Semester
As per Choice Based Credit System (CBCS)

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iii

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Ist Year / Ist Semester as per CBCS
B.Sc. (Chemistry) - Inorganic and Organic Chemistry

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

Chapter-1		
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
Chapter-2		
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 Compounds	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
Chapter-3		
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 carbonium ions	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
Chapter-4		
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.

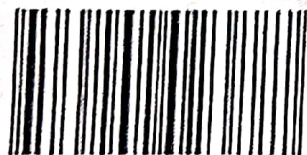
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Kolli Sunder Kumar



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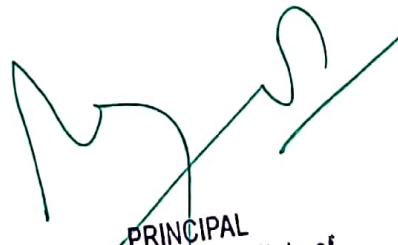
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CONTENTS

CHAPTER - 1	1-27
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
CHAPTER - 2	28-61
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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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
CHAPTER - 3	66-105
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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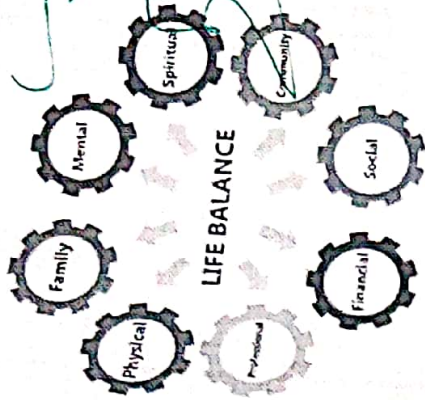


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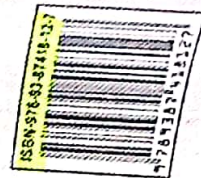


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CONTENTS

Foreword	iii
Preface	vii
Acknowledgements	ix
List of Tables	xi

Chapter	Title	Page No.
I	Introduction	1-32
II	Work Life Balance of Women Employees and IT Sector in India - An Overview	33-74
III	Personal and Family Factors affecting Work Life Balance of Women Employees	75-105
IV	Organizational WLB 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

311	Environment for Women Employment	316
312	Working Women Employees	317
313	Number of Working Hours and Domestic Work	318
314	Personal and Family Factors	319
315	Organizational WLB Practices	320
316	Work Life Balance and Job Satisfaction of Women Employees	321
317	Personal and Family Factors	322
318	Organizational WLB Practices	323
319	Work Life Balance and Job Satisfaction of Women Employees	324
320	Personal and Family Factors	325
321	Organizational WLB Practices	326
322	Work Life Balance and Job Satisfaction of Women Employees	327
323	Personal and Family Factors	328
324	Organizational WLB Practices	329
325	Work Life Balance and Job Satisfaction of Women Employees	330
326	Personal and Family Factors	331
327	Organizational WLB Practices	332
328	Work Life Balance and Job Satisfaction of Women Employees	333
329	Personal and Family Factors	334
330	Organizational WLB Practices	335
331	Work Life Balance and Job Satisfaction of Women Employees	336
332	Personal and Family Factors	337
333	Organizational WLB Practices	338
334	Work Life Balance and Job Satisfaction of Women Employees	339
335	Personal and Family Factors	340
336	Organizational WLB Practices	341
337	Work Life Balance and Job Satisfaction of Women Employees	342
338	Personal and Family Factors	343
339	Organizational WLB Practices	344
340	Work Life Balance and Job Satisfaction of Women Employees	345
341	Personal and Family Factors	346
342	Organizational WLB Practices	347
343	Work Life Balance and Job Satisfaction of Women Employees	348
344	Personal and Family Factors	349
345	Organizational WLB Practices	350
346	Work Life Balance and Job Satisfaction of Women Employees	351
347	Personal and Family Factors	352
348	Organizational WLB Practices	353
349	Work Life Balance and Job Satisfaction of Women Employees	354
350	Personal and Family Factors	355
351	Organizational WLB Practices	356
352	Work Life Balance and Job Satisfaction of Women Employees	357
353	Personal and Family Factors	358
354	Organizational WLB Practices	359
355	Work Life Balance and Job Satisfaction of Women Employees	360
356	Personal and Family Factors	361
357	Organizational WLB Practices	362
358	Work Life Balance and Job Satisfaction of Women Employees	363

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 Andhra Pradesh, India

LIST OF TABLES

Table No.	Title of the Table	Page No
2.1	Direct Employment in IT Industry in India	46
2.2	Share of Exports and Domestic Market in Total IT Revenues	47
2.3	Share of various sectors in total IT Revenue in India	49
2.4	Structure of IT Export from India	50
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)	53
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

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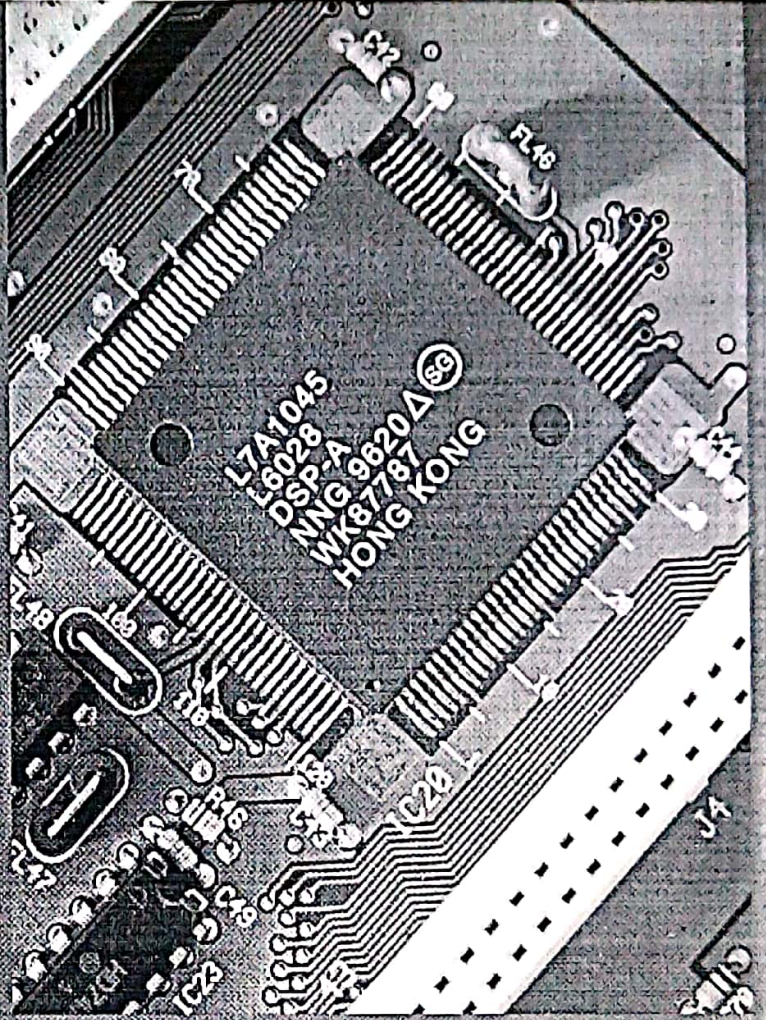


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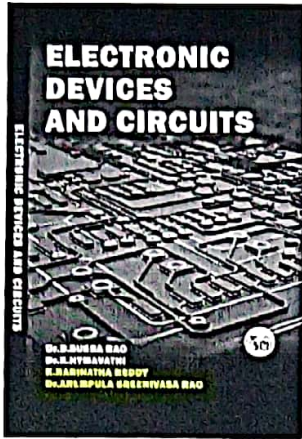
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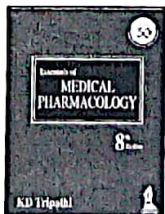
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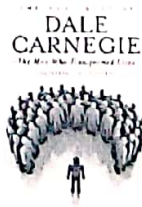
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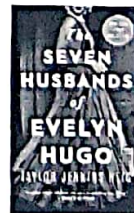
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