

TEXTBOOK OF
ORGANIC
chemistry

P.L. Soni • H.M. Chawla



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Textbook of
Organic Chemistry

A Textbook for B.Sc. and B.Sc. (Hons.) Students of Indian Universities

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Preface

Twenty-first century can be termed as an era of technological revolution. Advent of computers and advances in information technology and tele-communication have markedly affected our lives and the ways we approach the subject and solve the problems at the hand. During this rapidly changing scenario, we need to balance the incorporation of new advances and the existing traditional knowledge in the subject. It need be done judiciously such that we keep good traditions and embrace modernity for development and progress. We also need to adapt to the fast changing world without stressing the individuals and cater to both the tradition-bound and computer-savy students. Accordingly this new edition of *Textbook of Organic Chemistry* has been brought out in a new format and style for easy comprehension and we believe, our readers will appreciate the changes.

We sincerely feel that the revision of any book should serve two purposes. The first is to make the book easier for students to understand than the previous edition and second is to keep the contents of the book in conformity with the changing times by deleting obsolete ideas and procedures and introducing or expanding upon topics of increasing importance. These purposes are all the more important for a science like that of organic chemistry which has grown from its amoebic stage to its present robust giant structure just in 150 years and wherein new ideas are being experimented with every year. This makes the revision of *Textbook of Organic Chemistry* as almost a continuous effort. We are determined to keep the above goals in mind while revising the present book and over the years we have tried to make it more and more useful to our General and Honours students working for their first degree from the University.

In recent years, the courses in Organic Chemistry have been considered extremely important for students desirous of pursuing engineering and other technical courses and also for the ones who are heading for a career in biological and medical sciences. We have recognized this trend and therefore have included examples of biological interest at different places in the book.

Since the *Textbook of Organic Chemistry* is intended for the student, we have tried to present the matter in a brief but understandable fashion. We have attempted to 'explain' the things rather than presenting the facts in an encyclopaedic manner. Many texts, though excellent in their presentation, assume that the students can read between the lines and understand the concepts being put forth, but we feel this as an overestimate. We firmly believe that the success of any Textbook should be judged by the rate at which the weakest candidate grasps the subject-matter presented and this, in principle, is close to the well established scientific law that the rate of a chemical reaction is determined by the slowest step.

The real key to understand organic chemistry lies in its coherent organization. Therefore, we have freely used reaction mechanisms throughout the text. At places where we felt that the student's concentration might get diffused, some of the concepts have been explained in a smaller print. As student's understanding is our main goal, we have deliberately sacrificed some of the more accurate descriptions of the phenomena for little less accurate ones. For example, we have retained resonance structures rather than the more advanced, frontier molecular orbital diagrams with the feeling that once the solid foundation in the subject is laid, interested students can always go over to advanced literature.

The preparation of the new edition of the *Textbook of Organic Chemistry* gives us an opportunity not only to eliminate those mistakes that crept in the previous edition inadvertently but also to update the subject-matter. A major change in the new edition of the book that would be immediately noticed, is the addition of a number of new concepts and ideas in a chapter on Stereochemistry and spectroscopy. The chapter on Stereochemistry has been thoroughly rewritten to include modern concepts like origin

of chirality, asymmetric synthesis etc. We have also rewritten the sections on stereochemistry of cyclic compounds, correlation of different conformers of substituted cyclohexanes. Various aspects of static and dynamic stereochemistry have been dealt with rigorously and this entire chapter has been recast. This was necessitated by the increasing awareness about stereochemistry and need of the chemical world for the understanding of spatial relationship of different compounds, be they reactants or products; as it has been established beyond doubt that biological response of a compound is based essentially on its spatial recognition by the biosystem. The *E* and *Z* designations, the *R* and *S* nomenclature of stereoisomers, details of symmetry elements, etc. have been added and expanded in the revised edition. We have also included a large number of questions from latest university examinations in this edition while older list of questions have now been obviated.

Principles of mass spectroscopy, UV, IR and NMR spectroscopy have been greatly expanded and rewritten. Another obvious change in the new edition would be inclusion of spectroscopic analysis of type of compounds discussed in each chapter throughout the book. These chapters have been rewritten in order to make them conceptually clearer. New sections on Feiser-Woodward, and Feiser-Kuhn rules in UV spectroscopy, additional explanations and conclusions of various electronic transitions have been included in the chapter on spectroscopy besides the inclusion of a large number of problems and actual IR and NMR spectra of simple compounds so that students can appreciate these spectroscopic techniques better.

The chapters on biochemistry now includes structure and composition of the living cell. The basis for identity of all life forms and other topics of interest to students having a bent of mind towards biology have been added in this edition.

The chapters dealing with aromatic chemistry and heterocyclic compounds have been greatly improved over the previous editions. Mechanism of various reactions and rearrangements have been added at various places in this section of the book.

The chemistry of carbohydrates has been rewritten. Conformational isomerism in monosaccharides, disaccharides and polysaccharides has been explained and conversions encountered in carbohydrate chemistry have been provided in the new edition. Greater emphasis has been laid to explain the things so that students themselves are able to predict the chemical behaviour from the given structure. The chapter on proteins now includes principles of peptide bond formation and a discussion on primary, secondary, tertiary and quaternary structures of proteins. Newer synthesis have been added in the sections on alkaloids, terpenoids, ureides, purines and pyrimidines, and synthesis and natural dyes. Mechanistic discussion and explanations of facts have been stressed all through the book.

One of the major difficulties, the students generally feel, is with regard to solving numerical problems. In order to train them in the art of problem solving, we have included several appendices with the guidelines to solve problems. A large number of questions drawn from latest University examinations have been added at the end of each chapter of the book.

Though it is difficult to mention by name a large number of teachers and students who have been guiding the revision of the book, we take this opportunity to thank and acknowledge the assistance of all those individuals who have sent in their valuable suggestions for improvement of the book and assure them that we shall continue to incorporate all their suggestions in making this book more useful to students. We also thank many of our colleagues who have gone through the new material added in the book and Mr. D.K. Soni and Dr. M.S. Batra who took pains not only to proof-read some of the portions of the book but also in the preparation of an exhaustive index and formulating new additions to the book. We do hope that the new revised edition of the book will be more useful to students and teachers and we would continue to receive suggestions for its further improvement.

AUTHORS

Brief Contents

	<i>Figures</i>	<i>Tables</i>	<i>Long Answer Questions</i>	<i>Short Answer Questions</i>	<i>Problems</i>
Part I – General Organic Chemistry					
1. Introduction	–	–	2	4	–
2. Purification of Organic Compounds	23	–	15	10	–
3. Qualitative Analysis (Detection of Elements)	1	–	5	6	–
4. Quantitative Analysis (Estimation of Elements)	8	–	15	–	–
5. Determination of Molecular Mass	–	–	15	–	–
6. Empirical and Molecular Formulae	–	–	10	–	–
7. Structure of Organic Compounds	15	2	53	13	–
8. Classification and Nomenclature of Organic Compounds	–	–	9	–	–
9. IUPAC System of Nomenclature	–	2	31	–	–
10. The General Nature of Organic Reactions	8	–	27	32	–
11. Stereochemistry	19	2	51	–	–
12. Spectroscopy	64	12	130	–	–
Part II – Organic Compounds					
1. Alkanes or Paraffins	8	–	9	25	4
2. Alkenes or Olefins	15	–	22	54	10
3. Alkynes or Acetylenes	7	–	10	29	5
4. Petroleum	3	–	6	10	–
5. Halogen Derivatives	2	–	14	54	3
6. Monohydric Alcohols	2	–	15	34	7
7. Dihydric and Trihydric Alcohols	1	–	8	22	3
8. Ethers	–	–	6	25	–
9. Thioalcohols and Thioethers	–	–	7	4	–
10. Aldehydes and Ketones	3	–	16	57	9
11. Monocarboxylic Acids	3	–	9	40	5
12. Dicarboxylic Acids	–	–	6	18	4
13. Acid Derivatives	5	–	8	21	4
14. Esters, Oils and Fats	5	–	11	31	–
15. Amines	1	–	5	28	4
16. Cyanogen Compounds	–	–	4	6	–
17. Organometallic Compounds	1	–	5	32	4
18. Acetoacetic, Malonic and Cyanoacetic Esters	–	–	27	25	–
19. Substituted Acids-I	–	1	5	21	–
20. Substituted Acids-II	–	–	8	21	–
21. Alicyclic Compounds	–	–	7	6	–

	Figures	Tables	Long Answer Questions	Short Answer Questions	Problems
Part III – Aromatic Compounds					
1. Introduction to Aromatic Compounds	4	–	5	34	–
2. Coal-tar	1	–	2	5	–
3. Benzene and Its Homologues (Arenes)	10	–	15	55	8
4. Aromatic Halogen Compounds	1	–	16	44	2
5. Sulphonic Acids	–	–	7	17	3
6. Aromatic Nitro Compounds	5	–	10	19	2
7. Aromatic Amino-Compounds	3	–	13	46	4
8. Diazonium Salts	–	–	19	45	4
9. Phenols and Aromatic Alcohols	–	2	6	40	2
10. Aromatic Aldehydes and Ketones	–	–	18	45	3
11. Aromatic Acids	5	1	10	18	–
12. Naphthalene and its Derivatives	–	–	10	25	–
13. Anthracene and its Derivatives	2	–	10	21	–
14. Aromatic Heterocyclic Compounds – (i)	3	–	23	37	–
15. Aromatic Heterocyclic Compounds – (ii)	–	–	16	15	–
Part IV – Special Topics					
1. Carbohydrates	4	–	54	16	–
2. Proteins	5	6	16	26	–
3. The Ureides	–	–	10	22	–
4. Alkaloids	–	–	23	20	–
5. Terpenoids	–	–	27	18	–
6. Biochemistry	11	3	28	47	–
7. Chemistry in the Service of Man	–	–	21	54	–
8. Polymers	4	3	18	35	–
9. Colour and Dyes	–	–	27	36	–
Question Bank	–	–	100	1,115	–
Total	251	34	1,075	2,483	90

Contents

Part I — General Organic Chemistry

Chapter	Pages
1. Introduction	1-1
Origin of Organic Chemistry 1-1; Why Study Organic Chemistry 1-2; Organic Chemistry in the Service of Mankind 1-2 Questions 1-5.	
2. Purification of Organic Compounds	1-6
Introduction 1-6; Extraction of Organic Compounds 1-6; Methods for Purification of Organic Compounds 1-7; Some Important Modifications 1-8; Methods for purification of liquids 1-9; Chromatography 1-13; Analysis of mixture of Amino-acids 1-17; Drying of Organic Substances 1-20; Criteria of Purity 1-20; Questions 1-22.	
3. Qualitative Analysis (Detection of Elements)	1-23
Molecular Diagnosis 1-23; Detection of Carbon and Hydrogen 1-23; Detection of Nitrogen 1-24; Detection of Halogens 1-25; Detection of Sulphur 1-26; Detection of phosphorus 1-27; Detection of Metals 1-27; Questions 1-27.	
4. Quantitative Analysis (Estimation of Elements)	1-28
Introduction 1-28; Estimation of Carbon and Hydrogen 1-28; Necessary Modifications 1-31; Estimation of Oxygen 1-32; Estimation of Nitrogen 1-32; Dumas' Method 1-32; Kjeldahl's Method 1-35; Estimation of Halogens 1-36; Estimation of Sulphur 1-37; Estimation of Phosphorus 1-38; Questions 1-38.	
5. Determination of Molecular Mass	1-40
Molecular Mass is a Number 1-40; Molecular Mass of Volatile Substances 1-40; Victor Meyer's Method 1-40; Molecular Mass of Non-Volatile Substances 1-40; Silver Salt Method for Acids 1-42; Platinichloride Method for Bases 1-43; Volumetric Method for Acids and Bases 1-43; Questions 1-44.	
6. Empirical and Molecular Formulae	1-46
The Empirical Formula 1-46; Calculation of Empirical Formula from Percentage Composition 1-46; The Molecular Formula 1-47; Structural Formula 1-48; Rational or Condensed Formula 1-48; Determination of Structural Formula 1-49; Questions 1-51.	

- 7. Structure of Organic Compounds** 1-52
 Atomic orbitals involved in organic molecules 1-52; Hybridization 1-53; Effectiveness of Overlap 1-58; Molecular Orbital Theory 1-58; Bond Lengths and Bond Energies 1-63; Polarity of Bonds and Dipole Moment 1-65; The Hydrogen Bond 1-67; Inter-molecular Forces and Physical Properties 1-73; Inductive Effect 1-74; Electromeric Effect 1-75; Resonance 1-75; Delocalisation 1-78; Hyperconjugation 1-79; Acids and Bases 1-81; Questions 1-89.
- 8. Classification and Nomenclature of Organic Compounds** 1-94
 Classification of Organic Compounds 1-94; Group or Radical 1-95; Homologous Series 1-96; Nomenclature of Organic Compounds 1-96; Position of Numerals used in the Enumeration of Substituents 1-111; Writing of Names 1-111; Elision of Vowels 1-111; Punctuation Marks 1-112; Questions 1-112.
- 9. IUPAC System of Nomenclature** 1-114
 Naming Complex Compounds 1-114; Longest Chain Rule 1-114; Lowest Number Rule 1-114; Arrangement of Prefixes 1-115; Lowest Number for Functional Group 1-115; Writing Names for Compounds containing more than one functional group 1-117; Functional groups and the selected chain 1-119; Writing the IUPAC names 1-119; Writing the Structural Formula from given IUPAC name 1-121; Questions 1-123.
- 10. The General Nature of Organic Reactions** 1-131
 Introduction 1-131; The Cleavage and formation of bonds 1-131; Types of Organic Reactions 1-132; Energetics of Ionic or Polar Mechanisms 1-134; Carbocations 1-137; Ionic Mechanisms 1-140; Free Radicals 1-149; Free Radical Mechanism 1-151; Substitution Reactions 1-152; Addition Reactions 1-154; Elimination Reactions 1-155; Polymerisation 1-156; Energy of activation and progress of Reaction 1-156; Carbanions 1-159; Carbenes 1-160; Questions 1-160.
- 11. Stereochemistry** 1-164
 Isomerism 1-164; Types of Isomerism 1-164; Structural Isomerism 1-165; Geometrical Isomerism 1-168; Stereoisomerism 1-167; Nomenclature of Geometrical isomers (The E and Z System) 1-170; Determination of Configuration of the Geometrical Isomers, 1-175; Nature of light and optical Rotation; 1-175; Optically active substances and optical isomerism 1-178; Symmetry Elements and Chirality 1-181; Interaction of light with organic compounds 1-186; Configuration and sign of rotation 1-188; Optical Isomers of Lactic Acid 1-189; Optical Isomers of Malic Acid 1-189; Optical Isomers of compounds containing two Asymmetric Carbon atoms 1-190; Optical Isomers of Tartaric acid

1.190; Configuration : Specification of Configuration 1.191; Fisher projection Formula 1.193; Stereoisomers of molecules that contain two Asymmetric Carbon Atoms 1.195; R and S nomenclature for Optical Isomers 1.202; Writing the configurational symbol for optical isomers 1.204; Specification of configuration of compounds with more than one chiral carbons 1.206; Properties of Enantiomers 1.207; Resolution 1.210; Racemisation 1.212; Walden Inversion 1.213; Asymmetric Synthesis 1.215; Conformational Isomerism 1.216; Conformational Isomerism in open chain organic Compounds 1.221; Conformational isomerism in Cyclic compounds 1.223; Conformational Analysis 1.230; A Values 1.231; Questions 1.232.

12. Spectroscopy

1.241

Introduction 1.241; Origin of Electronic Spectra 1.241; Laws of Light Absorbance 1.242; Presentation of Spectral Data 1.243; Ultraviolet Spectroscopy 1.244; Electronic Transitions 1.246; Effect of Conjugation 1.251; The Woodward-Fieser rules for absorption spectra of dienes 1.252; Fieser-Kuhn Rules for Absorption spectra of Polyenes 1.255; Some Other Factors which Influence λ_{\max} 1.257; Ultraviolet spectrum of some isolated Chromophores 1.260; Applications of UV spectroscopy 1.261; Infrared Spectroscopy 1.263; Infrared Spectrum Range and Units Employed 1.263; Molecular Vibrations and Origin of the I.R. Spectrum 1.263; Instrumentation 1.266; Applications of IR Spectroscopy 1.267; Interpretation of Infrared Spectra 1.271; NMR Spectroscopy: Spinning Proton Resembles a Bar Magnet 1.284; Spinning proton in a magnetic field 1.284; NMR Spectra 1.285; Various Aspects of NMR Spectrum 1.286; NMR Spectrometer 1.286; Number of Signals obtained from a sample 1.287; Position of signals and chemical shift 1.289; Factors affecting Chemical Shifts 1.291; Number of Peaks in the NMR Spectra and Number of Equivalent Protons 1.292; Peak Area & Proton Counting 1.293; Splitting of Signals 1.293; Interpretation of the NMR spectrum 1.296; Chemical shift and Stereochemistry 1.306; Mass Spectrometry 1.309; Questions 1.314.

Part II — Organic Compounds

1. Alkanes or Paraffins

2.1

Structure of some Alkanes 2.1; Representation of organic compounds 2.2; Nomenclature of Alkyl Groups 2.5; Structural Isomerism in Alkanes 2.6; Conformational Isomerism in Alkanes 2.7; General methods of preparation of Alkanes 2.8; Mechanism of Catalytic Hydrogenation 2.11; IR Spectrum of Paraffins 2.15; General Chemical Properties of the Paraffins 2.15;

Thermodynamics and Kinetics of the Reactions of Methane with Halogens 2.19; Cycloalkanes, Cycloparaffins or Polymethylenes 2.22; Questions 2.23.

2. Alkenes or Olefins

The Olefins 2.25; Nomenclature 2.26; General Methods of Preparation 2.28; Mechanism of Dehydration of Alcohols 2.28; Orientation in E2 Elimination 2.31; General Properties of Olefins 2.31; Mechanism of Bromination 2.34; Stereochemistry of Addition of Halogens to Alkenes 2.35; Stereospecific reaction 2.36; Markownikoff's Rule 2.38; Mechanism of Hydroboration 2.43; Mechanism of Ozonolysis 2.45; Stereochemistry of Cycloaddition 2.48; Some Individual Members : Methylene 2.53; Ethylene or Ethene 2.54; Cycloalkenes 2.56; Baeyer Strain Theory 2.58; Theory of Strain in Rings 2.60; Coulson and Moffit's Concept of Maximum Overlap of Carbon Orbitals 2.61; Diolefins or Alkadienes : Nomenclature 2.62; Conjugated Dienes 2.63; Relative Stability of Dienes 2.70; Test your understanding 2.71; Questions 2.73.

2.25

3. Alkynes or Acetylenes

The Acetylenes 2.80 : Nomenclature 2.80; Preparation of Alkynes 2.81; Manufacture 2.83; Synthesis 2.84; Properties 2.84; Mechanism of Reduction of an Alkyne by Sodium in Ammonia 2.87; Nucleophilic Addition Reaction, Addition of alcohols 2.91; Formation of Acetylides 2.92; Analytical Tests for Acetylene 2.96; Ascent and Descent of Series and Typical Conversions 2.97; Questions 2.97.

2.80

4. Petroleum

What is Petroleum 2.101; Resources of Petroleum 2.101; Composition of Petroleum 2.102; Origin of Petroleum in Nature 2.102; Mining of Petroleum 2.103; Refining of Crude Oil 2.104; Products obtained and their Uses 2.105; Further Refining of Gasoline 2.106; How do Refineries increase the yield of Gasoline 2.106; Synthetic Gasoline, 2.106; Knocking and Octane Rating 2.107; Cetane Number 2.109; Flash Point 2.109; Petrochemical Industry 2.110; Questions 2.111.

2.101

5. Halogen Derivatives

General 2.112 Monohalogen Derivatives 2.112; Nomenclature 2.113; General Methods of Preparation 2.114; General Properties of Alkyl Halides 2.120; Nucleophilic Substitution Reactions 2.123; Elimination Reaction or Dehydrohalogenation 2.126; Reactions of Alkyl Halides (Summary) 2.128; Kinetics of Nucleophilic Aliphatic Substitution 2.129; Rearrangement in S_N^1 Reactions 2.131; Reactivities of Alkyl Halides in S_N^1 and S_N^2 Reactions 2.131; Factors that influence the Mechanism 2.132; Comparative Summary of S_N^1 and S_N^2 Reactions 2.133; Kinetics of Elimination

2.112

Reactions 2.134; Elimination vs. Substitution 2.135; Methyl Chloride 2.136; Ethyl Chloride 2.137; Ethyl Bromide, Bromoethane 2.137; Ethyl Iodide, Iodoethane 2.138; Isopropyl Iodide 2.138; Dihalogen Derivatives: Nomenclature 2.138; General Methods of Preparation 2.139; General Properties and Reactions 2.139; Methylene Chloride 2.140; Ethylene Chloride 2.141; Trihalogen Derivatives 2.141; Chloroform 2.141; Properties of Chloroform 2.142; Analytical Tests for Chloroform 2.144; Uses 2.144; Chloroform as an Anaesthetic 2.144; Iodoform, Tri-iodomethane 2.144; Tetrahalogen derivatives : Carbontetrachloride 2.146; Vinyl Chloride 2.147; Allyl Halides or 3-halogenopropene 2.149; Allyl Iodide 2.149; Some commercially known Halogen Derivatives 2.150; Kinetics of Nucleophilic Aliphatic Substitution 2.150; Questions 2.150.

6. Monohydric Alcohols

2-156

Introduction 2.156; Nomenclature 2.157; General Methods of Preparation 2.159; General Properties of Alcohols 2.163; Analytical Tests for Alcohols 2.171; Distinction between Primary, Secondary and Tertiary Alcohols 2.171; Spectroscopic Identification of Alcohols 2.173; Methyl Alcohol, Methanol 2.173; Properties of Methyl Alcohol 2.174; Analytical Tests 2.174; Ethyl Alcohol 2.174; Manufacture of Alcohol 2.174; Properties, Uses of Alcohol 2.175; Analytical Tests 2.175; Ascent and descent of Series and Typical conversions in alcohols 2.176; Fermentation 2.177; The Enzymes 2.178; Alcohol Industry : Manufacture of Ethanol by Fermentation 2.178; Absolute Alcohol 2.180; Methylated Spirit 2.181; Power Alcohol 2.181; Alcoholic Beverages 2.181; Alcoholometry 2.181; Unsaturated Alcohols: Vinyl Alcohol 2.182; Allyl Alcohol 2.182; Questions 2.183.

7. Dihydric and Trihydric Alcohols

2-188

Dihydric Alcohols 2.188; Nomenclature 2.188; Ethylene Glycol 2.188; Properties of Glycol 2.189; Uses 2.192; Ethylene Oxide 2.192; Trihydric Alcohols 2.194; Manufacture of Glycerol 2.194; Properties of Glycerol 2.196; Uses, Analytical Tests for glycerol and distinction from sugar solutions 2.199; Structure of Glycerol 2.199; Nitroglycerine 2.200; Estimation of Number of Hydroxyl Groups in a Polyhydric Alcohol 2.201; Questions 2.202.

8. Ethers

2-205

Ethers are Organic Oxides 2.205; Nomenclature 2.205; General Methods of Preparation of Ethers 2.206; Williamson's Synthesis 2.206; General Properties of Ethers 2.208; Reactions of the Alkyl Group 2.209; Reactions due to Instability of Ethereal Oxygen, the Carbon to Oxygen Linkage 2.210; Spectroscopic Analysis of Ethers 2.211; Dimethyl Ether or Methyl Ether 2.213; Diethyl Ether or Ethyl Ether 2.213; Properties of Diethyl Ether 2.213; Uses 2.214;

Isopropyl Ether, $\beta:\beta'$ Dichloroethyl Ether, Vinyl Ether, How are Ethers distinguished from Alcohols 2.214; Estimation of number of methoxy groups in a compound (Zeisel's method) 2.215; Questions 2.215.

2.217

9. Thioalcohols and Thioethers

The Aliphatic Sulphur Compounds 2.217; Thioalcohols, Thiols or Mercaptans, Nomenclature 2.217; General Methods of Preparation, Properties 2.218; Uses of Mercaptans 2.220; Sulphonal 2.220; Thioethers or alkyl sulphides 2.220; General Methods of Preparation 2.220; Properties of Thioethers 2.221; Mustard gas 2.222; Questions 2.222.

2.224

10. Aldehydes and Ketones

Carbonyl Compounds 2.224; Nomenclature 2.227; General Methods of Preparation of Aldehydes and Ketones 2.228; General Properties of Aldehydes and Ketones 2.232; Nucleophilic Addition to the Carbonyl Group 2.233; Nucleophilic attack by 'hydride' on Aldehydes and Ketones 2.245; Aldol condensation 2.247; Its mechanism 2.248 Enolization 2.249; Haloform Reaction 2.250; Formaldehyde 2.256; Cannizarro's reaction 2.257; Acetaldehyde 2.258; Chloral 2.261; Acrolein 2.264; Crotonaldehyde, Acetone, Dimethyl ketone or Propan-2-one 2.266; Ethyl methyl ketone, Methyl isopropyl ketone, Tert Butylmethyl ketone 2.268; Methyl vinyl ketone (But-3-en-2-one) 2.269; Mesityl oxide, Phorone (2, 6-Dimethyl-2, 5-heptadien-4-one) 2.270; Questions 2.270.

2.276

11. Monocarboxylic Acids

Carboxylic Acids, Fatty Acids 2.276; Nomenclature of Fatty Acids 2.277; General Methods of Preparation of Fatty Acids 2.278; General Properties of Fatty Acids 2.280; Reactions of Alkyl Group 2.281; Reactions of Carboxyl Group 2.282; Reactions involving the hydroxyl Group 2.283; Reactions involving Carboxyl Group as a whole 2.283; Detection of the Carboxyl Group 2.285; Acidity of Carboxylic Acids 2.286; Formic Acid (Methanoic Acid) 2.288; Properties of formic acid 2.290; Uses 2.291; Tests for formic acid and formates 2.292; Acetic Acid, Ethanoic Acid 2.292; Properties 2.293; Analytical Tests for Acetates and Acetic Acid 2.294; Comparison of Formic Acid and Acetic Acid 2.295; Vinegar 2.295; Propionic acid or Propanoic Acid 2.295; Butyric acid (Butanoic acid) 2.296; Higher Fatty Acids 2.296; Unsaturated Monocarboxylic Acids 2.296; Acrylic Acid (2-Propenoic Acid) 2.297; Crotonic and Iso-crotonic Acid 2.298; Oleic Acid 2.298; Questions 2.299.

12. Dicarboxylic Acids

Nomenclature 2.303; General Methods of Preparation 2.304; General Properties 2.305; Oxalic acid 2.307; Properties of Oxalic

2.303

Acid 2·308; Malonic Acid, Succinic Acid 2·310; Properties of Succinic acid 2·311; Unsaturated Dicarboxylic Acids, Maleic Acid 2·312; Fumaric Acid 2·313, Questions 2·316.

13. Acid Derivatives

2·318

Functional Derivatives of Carboxylic Acids, Nucleophilic Substitution at the Acyl Carbon 2·318; Relative Reactivity of Acyl Compounds 2·319; Nucleophilic Substitution at Alkyl and Acyl Carbons, 2·321; Acid or Acyl Chlorides : Nomenclature, General Methods of Preparation 2·322; General Properties of Acid Chlorides 2·323; Fomyl Chloride 2·325; Acetyl Chloride 2·326; Acid Anhydrides, Nomenclature, Acetic Anhydride 2·327; Acid Amides 2·330; Formamide, Acetamide (Ethanamide) 2·331; Amides of Carbonic acid, Carbamic Acid 2·335; Ammonium Carbamate, Urethane 2·335; Urea (Carbamide) 2·336; Thiourea (Thiocarbamide) 2·341; Questions 2·341.

14. Esters, Oils and Fats

2·344

Esters and Esterification 2·344; Esters of Organic Acids, 2·344; Distinction between Esters and Salts 2·345; General Methods of Preparation of Esters 2·346; General Properties of Esters 2·347; Uses of Esters 2·349; Ethyl Acetate 2·350; Ethyl Orthoformate, Ethyl Hydrogen Sulphate 2·351; Methyl Sulphate, Ethyl Nitrate 2·352; Esters of Nitrous Acid, Alkyl Nitrites 2·353; Nitro alkanes or Nitroparaffins 2·354; Distinguishing Properties of Nitroparaffins and Alkyl Nitrites 2·356; Oils and Fats, Properties and Uses of Oils and Fats 2·357; Hydrogenation of Oils, Analysis of Oils and Fats 2·360; Classification of Oils 2·361; Distinction between Animal and Vegetable Fats, Waxes, Soaps and Soapless Detergents, Saponification or Soap making 2·362; Manufacture of soap 2·363; How does a Toilet soap differ from a Laundry Soap, Some special Varieties of Soap, Cleansing Action of Soap 2·364; Synthetic Detergents 2·365; Candles 2·366; Questions 2·367.

15. Amines

2·369

Amines are Alkyl Ammonias, Nomenclature 2·369; Structure of Amines and optical Activity 2·370; General Methods of Preparation 2·371; Separation of Mixture of Amines 2·376; General Properties of Amines 2·377; Spectroscopic analysis of amines 2·378; Methylamine 2·384; Ethylamine, Dimethylamine 2·385; Trimethylamine, Distinguishing Tests between Primary, Secondary and Tertiary Amines 2·386, Quaternary Ammonium Compounds, Tetra-alkyl ammonium Halides, Tetra-alkyl ammonium Hydroxides 2·387; Ascent and Descent of Series 2·390; Questions 2·390.

16. Cyanogen Compounds

2·393

Introduction, Hydrocyanic acid 2·393; Alkyl Cyanides 2·394; Alkyl Isocyanides 2·398; Distinguishing Tests of Ethyl Cyanide and Ethyl

Isocyanide 2.399; Cyanogen, Cyanogen Chloride, Cyanic Acid 2.400; Alkyl Isocyanates 2.401; Questions 2.402.

17. Organometallic Compounds

2.403

Introduction 2.403; The Grignard Reagents 2.404; Structure of Grignard Reagents 2.405; Properties 2.406; Synthetic Uses of Grignard Reagents 2.407; Limitations of Grignard Synthesis 2.411; Organozinc Compounds 2.412; Organolithium Compounds, Alkylolithiums 2.414; Organolead Compounds, Tetraethyllead 2.416; Questions 2.417.

18. Acetoacetic, Malonic and Cyanoacetic Esters

2.422

Reactive Methylene Group 2.422; Acetoacetic Ester or Ethyl Acetoacetate 2.423; Properties 2.424; Use of Acetoacetic Ester in Organic Synthesis 2.427; Constitution of Acetoacetic Ester 2.431; Diethyl Malonate or Malonic Ester 2.432; Preparation, Synthetic uses of Malonic ester 2.433; Cyanoacetic Ester or Ethyl Cyanoacetate 2.437; Use of Cyanoacetic ester in the synthesis of organic compounds 2.438; Spectral analysis of acetoacetic, malonic and cyanoacetic esters 2.440; Proton NMR spectroscopy 2.441; Questions 2.442.

19. Substituted Acids—I

2.446

The Substituted Acids, Halogen-substituted Acids 2.446; Monochloroacetic Acid 2.450; Dichloroacetic Acid, Trichloroacetic Acid 2.451; Amino Acids 2.452; Glycine 2.456; Questions 2.457.

20. Substituted Acids—II

2.460

Hydroxy Acids, General Methods of Preparation of Hydroxy Acids 2.460; Properties 2.461; Some Individual Members: Glycolic acid, Hydroxyacetic acid, Hydroxyethanoic acid 2.462; Lactic acid 2.464; Malic acid, Monohydroxy succinic acid 2.466; Tartaric acid 2.467; Citric acid 2.472; Questions 2.474.

21. Alicyclic Compounds

2.477

Alicyclic Compounds 2.477; Cycloalkanes, Cycloparaffins or Polymethylenes 2.478; Individual Members: Cyclopropane or trimethylene 2.483; Cyclobutane or Tetramethylene, Cyclopentane or Pentamethylene 2.484; Cyclohexane or Hexamethylene 2.485; Decalin, Questions 2.486.

Part III — Aromatic Compounds

1. Introduction to Aromatic Compounds

3.1

Aromatic compounds, Reasons for Separate Classification of Aromatic compounds 3.1; Nomenclature of Aromatic Compounds

3·2; Homologous Series named after the Hydrocarbons or Aryl Groups 3·4; Homologous Series named after the Acids 3·7; Orientation 3·9; Substitution in the Benzene Ring, Directive Influence of Groups 3·13; Introduction of a Third Group into the Benzene ring 3·14; Separation of Isomers 3·15; Effect of Substituents: Reactivity and Orientation 3·16; Mechanism of Aromatic Substitution 3·17; Reactivity and Orientation 3·21; Theory of Reactivity 3·25; Theory of Orientation 3·26; Electron release by resonance 3·28; Summary, Test Your Understanding 3·30; Questions 3·31.

2. Coal-tar

3·35

Destructive Distillation of Coal 3·35; Coal-tar, Fractional Distillation of Coal-tar 3·36; Questions 3·38.

3. Benzene and Its Homologues (Arenes)

3·39

Aromatic Hydrocarbons, General Methods of Preparation of Benzene and its Homologues 3·39; General Properties of Benzene and its Homologues 3·42; Individual Members : Benzene 3·54; Aromaticity or the Aromatic Character 3·58; Molecule Orbital theory of Aromaticity 3·60; Aromatic Character and the Huckel's Rule 3·61; Toluene, Methylbenzene or Phenyl methane, Xylene 3·64; Mesitylene, 1, 3, 5-Trimethylbenzene, Cymene, Cumene, Isopropyl benzene 3·65; Styrene, Phenyl ethylene, vinylbenzene, Comparative Study of Benzene and Toluene 3·66; Anulenes 3·67; Questions 3·69.

4. Aromatic Halogen Compounds

3·78

General, General Methods of Preparation 3·78; General Physical Properties of Halogen Derivatives, Chemical Properties of Nuclear derivatives (Aryl halides) 3·85; Low Reactivity of Aryl Halides 3·92; Chemical Properties of Side-chain Derivatives (Aralkyl halides) 3·93; Comparative study of Nuclear and Side-chain Derivatives 3·96; Individual Members : Chlorobenzene (Phenyl chloride) 3·96; Bromobenzene (Phenyl bromide), Iodobenzene (Phenyl Iodide) 3·97; chlorotoluenes (Tolyl Chlorides) 3·98; Benzyl Chloride (Phenyl methyl chloride), Benzylidene Chloride 3·99; Benzylidyne Chloride, Benzotrichloride 3·100; Benzene hexachloride, Transition from ortho-para to meta orientation, Questions 3·101.

5. Sulphonic Acids

3·107

Introduction 3·107; Methods of preparation 3·107; Isolation of Sulphonic Acids 3·108; Physical Properties of Sulphonic Acids, Reactions of Sulphonic Acids 3·110; Benzenesulphonic Acid 3·114; Benzenesulphonyl-Chloride 3·115; Benzenedisulphonic Acids 3·116; Toluenesulphonic Acids 3·117; Saccharin 3·118; Questions 3·119.

6. Aromatic Nitro Compounds

Nitration 3-122; General Properties of the Nitro Compounds 3-125; Individual Members : Nitro benzene (Oil of Mirbane) 3-126; Meta-Dinitrobenzene 3-131; Ortho and Para-Dinitrobenzenes 3-132; *s*-Trinitrobenzene or 1, 3, 5-Trinitrobenzene 3-133; Nitrotoluenes 3-134; Trinitrotoluene (TNT) 3-135; TNT as a High Explosive 3-135; Phenylnitromethane 3-136; Questions 3-137.

7. Aromatic Amino-Compounds

Aromatic Amino compounds or Aromatic amines 3-140; General Methods of Preparation of Primary Amino Compounds 3-141; Aniline (Benzenamine) 3-143; Spectral Characteristics of Aromatic Amines 3-146; Comparison of Aniline with Ethylamine 3-156; Aniline Hydrochloride, Acetanilide (N-Phenylacetamide) 3-156; Sulphanilic acid (*p*-aminobenzene sulphonic acid) 3-157; Sulphanilamide (*p*-amino benzene sulphonamide) 3-158; Nitroanilines 3-159; Tolidines (*o*-, *m*- and *p*-) or 2-, 3- and 4-Methylbenzenamines 3-161; Benzenediamine or Phenylenediamines 3-162; *o*-phenylenediamine 3-162; *m*-phenylenediamine, *p*-phenylenediamine 3-163; Diphenylamine 3-164; N-Methylaniline 3-165; Tertiary amino-compounds Triphenylamine 3-166; N, N-Dimethylaniline 3-166; Aliphatic Amines : Benzylamine 3-168; Distinguishing tests for Different Amines 3-169; Questions 3-170.

8. Diazonium Salts

Diazotisation 3-177; Nomenclature, Benzenediazonium chloride 3-178; Use of Diazonium Salts in Organic Synthesis 3-190; Phenylhydrazine 3-193; Diazoaminobenzene 3-194; Dyeing and Calicoprinting, Aliphatic Diazo Compounds, Diazomethane 3-195; Reactions of Carbenes 3-201; Diazoacetic ester, Ethyldiazoacetate 3-203; Questions 3-205.

9. Phenols and Aromatic Alcohols

Introduction 3-212; General Methods of Preparation of Phenols 3-213; General Properties of Monohydric Phenols 3-214; Phenol (Carbolic acid, Benzenol) 3-216; Spectral Analysis of Phenols 3-219; Reactions of Phenols which are different from those of alcohols 3-224; Substituted Phenols : Nitrophenols 3-235; Picric acid (2,4,6-trinitrophenol) 3-237; Aminophenols 3-238; Homologues of Phenol, Methylphenols, Cresols 3-239; Dihydric Phenols, 1,2-Dihydroxybenzene (Common name : Catechol) 3-240; 1,3-Dihydroxybenzene (Common name : Resorcinol) 3-241; 1,4-Dihydroxybenzene (Common name : Quinol) 3-243; Trihydric Phenols, 1,2,3-Trihydroxybenzene (Common name : Pyrogallol), 1,2,4-Trihydroxybenzene (Common name : Hydroxyquinol) 3-244; 1,3,5-trihydroxybenzene (Common name :

Phloroglucinol) 3.245; Phenolic ethers, Aromatic alcohols, Benzyl alcohol 3.246; β -Phenylethyl alcohol, Questions 3.249.

10. Aromatic Aldehydes and Ketones

3.258

The Aromatic Aldehydes, Benzaldehyde 3.258; Cinnamaldehyde, 3-Phenylpropenal 3.268; Phenolic Aldehydes or Hydroxy benzaldehydes 3.269; Salicylaldehyde 3.270; Vanillin 3.271; Anisaldehyde, Protocatechualdehyde 3.272; Piperonal, The Aromatic Ketones 3.273; Acetophenone, 3.274; Spectral Characteristics of Aromatic Aldehydes and ketones 3.274; Phenolic Ketones 3.279; Benzophenone (Diphenyl ketone) 3.280; Quinones, Benzoquinones, *p*-Benzoquinone 3.281, *o*-Benzoquinone, Questions 3.284.

11. Aromatic Acids

3.291

Introduction, General Methods of Preparation 3.291; General Properties 3.293; Benzoic acid (benzenecarboxylic acid) 3.293; Spectral characteristics of Aromatic Acids 3.294; Distinction between Benzoic acid and Phenol, Benzoyl chloride 3.297; Benzamide 3.300; Benzoic anhydride 3.301; Benzoyl peroxide, Benzotrile 3.302; Toluic acids 3.303; Substituted Benzoic Acids, Anthranilic acid (*o*-aminobenzoic acid), *p*-Aminobenzoic acid, Salicylic acid (*o*-hydroxybenzoic acid) 3.304; Methyl salicylate, Salol (phenyl salicylate) 3.308; Aspirin, Gallic acid (3,4,5-Trihydroxy benzoic acid) 3.309; Blue Black Ink, The Ortho effect 3.310; Monobasic Acids with the Carboxyl group in the Side-chain, Phenylacetic acid 3.311; Mandelic acid (phenyl glycollic acid), Cinnamic acid (β -phenylacrylic acid) 3.312; Coumarin, Phthalic acid 3.314; Phthalic anhydride 3.317; Phthalimide, Acidity of Aromatic Acids 3.319; Questions 3.322.

12. Naphthalene and its Derivatives

3.326

Introduction 3.326; Naphthalene : Nomenclature and Isomerism of Naphthalene Derivatives 3.327; Manufacture of Naphthalene, Properties of Naphthalene 3.328; Orientation of Electrophilic Substitution in Naphthalene 3.335; Uses, Constitution of Naphthalene 3.338; Fries Rules 3.341; Derivatives of Naphthalene, Halogen Derivatives, Nitro-naphthalene, Naphthalenesulphonic acid 3.342; Naphthylamines 3.343; Naphthols 3.345; Naphthaquinone 3.348; Synthesis of 1-substituted naphthalenes, Synthesis of 2-substituted naphthalenes, Questions 3.350.

13. Anthracene and its Derivatives

3.354

Anthracene, Nomenclature and isomerism of Anthracene derivatives, Preparation of anthracene 3.354; Properties of Anthracene 3.355; Uses of Anthracene, Structure 3.359; Derivatives of Anthracene : Anthraquinone 3.362; Alizarin 3.365; Phenanthrene 3.367; Questions 3.372.

14. **Aromatic Heterocyclic Compounds—(i)** 3-274
 Introduction 3-374; Furan, oxacyclopenta-2,4-diene 3-376; Furfural or 2-furaldehyde 3-381; Thiophene, Thiacyclopenta-2,4-diene 3-383; Pyrrole, Azacyclopenta-2,4-diene 3-386; Pyridine, Azabenzene 3-392; Structure of Pyridine 3-397; Homologues and Derivatives of Pyridine, 3-400; Piperidine 3-400; Questions 3-401.

15. **Aromatic Heterocyclic Compounds—(ii)** 3-407
 Condensed Ring Systems, Indole 3-407; Indoxyl, Isatin 3-412; Quinoline 1-Azanaphthalene or α , β -Benzopyridine 3-413; Constitution of Quinoline 3-419; Isoquinoline 3-419; Indigo : Indigotin 3-423; Questions 3-427.

Part IV — Special Topics

1. Carbohydrates 4-1

Introduction 4-1; Their Classification, 4-1; The Monosaccharides 4-2; Glucose, Grapesugar or Dextrose 4-3; Reactions of Glucose 4-6; Constitution of Glucose 4-12; Mutarotation 4-19; Conformations of Glucose 4-20 Fructose, Fruit Sugar or Laevulose 4-23; Comparison between Glucose and Fructose 4-28; Constitution of Fructose 4-28; Configuration of Fructose 4-30; Some Typical conversions in Monosaccharides 4-31; Disaccharides 4-35; Sucrose, Cane-sugar or Beet sugar 4-35; Manufacture of sucrose 4-36; Properties of Sucrose 4-38; Uses 4-40; Analytical Tests for Sucrose 4-40; Constitution 4-40; Maltose 4-43; Lactose 4-44; Polysaccharides: Starch 4-45; Glycogen 4-51; Dextrin 4-51; Inulin 4-51; Cellulose 4-51; Functions of Carbohydrates in the Living Systems 4-53; Artificial Silk or Rayon 4-54; Paper 4-55; Questions 4-57.

2. Proteins 4-65

Introduction 4-65; Composition of Proteins 4-65; Nature of Proteins 4-66; Primary, Secondary, Tertiary and Quaternary Structures of Proteins 4-68; Classification of Proteins according to composition 4-78; Classification of Proteins according to Functions 4-81; Isolation of Proteins 4-81; General and Physical Characteristics of Proteins 4-87; Chemical Properties 4-88; Analytical Tests for Proteins 4-89; Uses of Proteins 4-90; Estimation of free Amino and Carboxyl groups 4-91; Questions 4-92.

3. The Ureides 4-95

Ureides 4-95; Classification 4-95; Preparation of ureides 4-96; General Chemical Behaviour of Ureides 4-97; Pyrimidine 4-98. The Purines 4-99; Uric acid 4-100; Xanthine, 4-100, Caffein, 1,3,7-trimethylxanthine 4-105; Theobromine 4-109; Adenine, 6-

aminopurine 4·109; Guanine 2 amino-6-hydroxypurine 4·109; Hypoxanthine 4·109; Questions 4·109.

4. Alkaloids

4·111

Introduction, Occurrence, Extraction of Alkaloids Plants 4·111; General Properties 4·112; Determination of Chemical Constitution of Alkaloids 4·112; Functional Nature of Oxygen, Functional Nature of Nitrogen 4·113, Some Individual Members : Coniline 4·115; Piperine 4·117; Nicotine 4·120; Atropine 4·123; Quinine, Cinchonine, Morphine 4·128; Questions 4·129.

5. Terpenoids

4·131

Introduction, Isoprene Rule 4·131; Isolation and General Properties of Terpenoids, Acyclic Monoterpenoids, Myrcene 4·133; Geraniol 4·135; Citral 4·136; Monocyclic Monoterpenoids, Nomenclature 4·142; Menthol 4·143; Limonene 4·144; Bicyclic Monoterpenoids: Introduction 4·146; α -Pinene 4·147; Sesquiterpenoids, Deterpenoids 4·149; Triterpenoids, Tetrapenoids 4·150; Polyterpenoids, Questions 4·151.

6. Biochemistry

4·154

Living Systems, Identicality of all Life Forms 4·154; Structure and Composition of Cell 4·155; The Molecules of Life, Carbohydrates 4·156; Importance of Carbohydrates for the Living Systems 4·157; Lipids, Fats and oils, Carotenoids 4·158; Vitamins 4·159; Enzymes 4·161; Tetrapyrroles or Porphyrins 4·165; Hormones 4·166; Proteins, Production of Energy 4·167; Nucleic acids, Nucleosides 4·169; Functions of Nucleotides, Nucleotide as Energy Carriers 4·172; Principal Types of Nucleic Acids, Structure of DNA 4·173; Replication of DNA 4·175; Functions of DNA 4·175; Structure and Functions of RNA 4·176; Utilization of Energy 4·178; Viruses 4·180; Biological Aspects of Ageing 4·181; Biosynthesis of Proteins 4·182; Questions 4·183.

7. Chemistry in the Service of Man

4·186

Introduction, Chemotherapy 4·186; The Sulpha Drugs (Sulphonamides) 4·187; Antibiotics 4·190; Chemotherapy in Malaria 4·194; Antimalarial Drugs, Synthetic Antimalarial Drugs 4·195; Antipyretics and Analgesics: Antipyretics 4·199; Analgesics 4·201; Tranquillizers, Hypnotics 4·202; Psychedelic Drugs, Birth Control Pills 4·203; Anaesthetics, Antiseptics and Disinfectants 4·204; Pesticides 4·206; Questions 4·208.

8. Polymers

4·212

Introduction, Classification of Polymers 4·212; Classification of Polymers based upon Intermolecular Interactions, Classification of Polymers based upon structure 4·214; Types of Polymerisation Reactions 4·215: The Process of Addition Polymerisation, Free-

radical Polymerisation of Alkenes and Dienes 4.217; Ionic Polymerisation 4.219; Ziegler-Natta Polymerisation 4.221; Stereochemistry of Polymers 4.222; Plasticity 4.223; Types of Plastics 4.224; Molecular Mass of Polymers 4.225; Classification of resins and Plastics 4.226; Natural and Synthetic Rubbers 4.234; Synthetic Rubbers 4.236; Buna Rubbers, Questions 4.237.

9. Colour and Dyes

Colour Sensation 4.241; Dyes and Dyeing, Colour and constitution 4.242; Valence Bond Theory of Colour 4.245; Classification of Dyes, Classification of Dyes According to Application 4.246: Direct or Substantive Dyes 4.246; Mordant dyes, Ingrain dyes, Vat dyes, Classification of Dyes according to Chemical Structure 4.247; Questions 4.258.

4.241

Question Bank

Appendix 1

New Type Question Bank-I AN-1; Short Answer Type Questions AN-1; Objective Type Questions AN-11; key AN-12.

AN-1

Appendix 2

Typical Numerical Problems AN-13; Problems on structural formula AN-13; Isomeric compounds AN-14; Questions AN-15; Answers to Questions AN-20.

AN-13

Appendix 3

Typical conversions AN-30; Ascent of series AN-30; Descent of series AN-30; Typical Examples of Ascent and Descent of the Series AN-32; Miscellaneous conversions AN-33; Long Answer Type Questions AN-35.

AN-30

Appendix 4

Miscellaneous Questions AN-37; What happens when Type Questions AN-37; Writing of structural formulae type Questions AN-40; Name Reactions type questions AN-41; Questions on important reagents AN-41; How will you distinguish between Type Questions AN-41; How will you prepare a compound Type questions AN-42; How will you show that type questions AN-43; Explain why type questions AN-43; Write short notes on Type questions AN-45; Questions on reaction mechanisms AN-46;

AN-37

Appendix 5

New Type Question Bank-II; Short answer Type questions AN-47; Objective type questions AN-49; Selection Test Type questions AN-49; True False Type questions AN-52; Key AN-53; Complete the reaction Type questions AN-53; Key AN-54; Match the statements

AN-47

in two columns type questions AN-55; Key AN-55; Selection of one among various alternatives type questions AN-56; Key An-56.

Appendix 6

Problems on Aromatic Synthesis

AN-57

Introduction AN-57; Various Synthetic Routes AN-57; Sequence of Steps AN-58; Problems AN-61; Key AN-61.

Appendix 7

Typical Numerical Problems

AN-70

Problems on Structural Formula AN-70; Isomeric Compounds AN-72; Questions AN-74; Answers AN-79.

Appendix 8

Miscellaneous Questions

AN-95

What Happens When, Type Questions AN-95; 'How Will You Convert' Type Questions AN-99; 'How will you Prepare' Type Questions AN-101; 'How will you Distinguish Between' Type Questions AN-104; 'Write the Structural Formulae' Type questions AN-105; 'Some Name Reactions' Type Questions AN-106; Questions on Important Reagents AN-107; Write Short Notes' Type Questions AN-108; 'How will you Show' Type Questions AN-108; 'How will you Detect the Following' Type Questions AN-109; 'How will you Separate' Type Questions AN-109; 'Explain Why' Type Questions AN-109; Complete the following type Questions AN-111; Reaction Mechanism Type Questions AN-115.

Appendix 9

AN-117

New Type Question Bank—(III)

Short Answer Type Questions AN-117; Selection of a Suitable Answer Type Questions AN-144; Explain the Following Type Questions AN-148; 'Match the Following' Type Questions AN-148; Identification of Name Type Questions AN-149; Do as Directed Type Questions AN-149; Fill in the Blanks Type Questions AN-149.

Some Questions From University Examinations

AN-151

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