

# Contents

<b>Preface</b>	<b>ix</b>
<b>1 Introduction</b>	<b>1</b>
1.1 Role of chemistry in modern life	1
1.2 Physical properties of drug molecules	3
<b>2 Atomic structure and bonding</b>	<b>17</b>
2.1 Atoms, elements and compounds	17
2.2 Atomic structure: orbitals and electronic configurations	18
2.3 Chemical bonding theories: formation of chemical bonds	21
2.4 Electronegativity and chemical bonding	27
2.5 Bond polarity and intermolecular forces	28
2.6 Significance of chemical bonding in drug–receptor interactions	31
<b>3 Stereochemistry</b>	<b>35</b>
3.1 Stereochemistry: definition	36
3.2 Isomerism	36
3.3 Significance of stereoisomerism in determining drug action and toxicity	53
3.4 Synthesis of chiral molecules	55
3.5 Separation of stereoisomers: resolution of racemic mixtures	56
3.6 Compounds with stereocentres other than carbon	57
3.7 Chiral compounds that do not have a tetrahedral atom with four different groups	57
<b>4 Organic functional groups</b>	<b>59</b>
4.1 Organic functional groups: definition and structural features	60
4.2 Hydrocarbons	61
4.3 Alkanes, cycloalkanes and their derivatives	61
4.4 Alkenes and their derivatives	103
4.5 Alkynes and their derivatives	108
4.6 Aromatic compounds and their derivatives	112
4.7 Heterocyclic compounds and their derivatives	143
4.8 Nucleic acids	170
4.9 Amino acids and peptides	179
4.10 Importance of functional groups in determining drug actions and toxicity	184
4.11 Importance of functional groups in determining stability of drugs	188
<b>5 Organic reactions</b>	<b>191</b>
5.1 Types of organic reaction	191
5.2 Radical reactions: free radical chain reactions	192
5.3 Addition reactions	197
5.4 Elimination reactions: 1,2-elimination or $\beta$ -elimination	223

5.5 Substitution reactions	232
5.6 Hydrolysis	260
5.7 Oxidation–reduction reactions	264
5.8 Pericyclic reactions	278
<b>6 Natural product chemistry</b>	<b>283</b>
6.1 Introduction to natural product drug discovery process	283
6.2 Alkaloids	288
6.3 Carbohydrates	303
6.4 Glycosides	319
6.5 Terpenoids	331
6.6 Steroids	352
6.7 Phenolics	359
<b>Index</b>	<b>371</b>