

CONTENTS

LIST OF JOURNAL ABBREVIATIONS

PAGE
xii

CHAPTER

I. PHYSICAL PROPERTIES AND CHEMICAL CONSTITUTION		1
Introduction, 1. Van der Waals forces, 1. The hydrogen bond, 2. Melting point, 3. Boiling point, 4. Solubility, 4. Viscosity, 5. Molecular volumes, 5. Parachor, 6. Refrachor, 7. Refractive index, 7. Molecular rotation, 8. Rotatory dispersion, 10. Dipole moments, 11. Magnetic susceptibility, 12. Absorption spectra, 13. X-ray analysis, 16. Electron diffraction, 17. Neutron crystallography, 17. Electron spin resonance, 17. Nuclear magnetic resonance, 17.		
II. OPTICAL ISOMERISM		20
Stereoisomerism: definitions, 20. Optical isomerism, 20. The tetrahedral carbon atom, 21. Conformational analysis, 28. Conventions used in stereochemistry, 30. Correlation of configurations, 34. Specification of asymmetric configurations, 35. Elements of symmetry, 37. Number of isomers in optically active compounds, 40. The racemic modification, 45. Properties of the racemic modification, 48. Methods for determining the nature of the racemic modification, 49. Quasi-racemate method, 50. Resolution of racemic modifications, 51. The cause of optical activity, 56.		
III. NUCLEOPHILIC SUBSTITUTION AT A SATURATED CARBON ATOM		60
S_N1 and S_N2 mechanisms, 60. FACTORS AFFECTING MECHANISM: Polar effects, 61. Steric effects, 63. Nature of the halogen atom, 65. Nature of reagent, 66. Nature of solvent, 67. WALDEN INVERSION, 69. Mechanism of Walden inversion, 71. S_Ni mechanism, 73. Participation of neighbouring groups, 74. ASYMMETRIC SYNTHESIS: Partial asymmetric synthesis, 79. Conformational analysis, 82. Absolute asymmetric synthesis, 85.		
IV. GEOMETRICAL ISOMERISM		87
Nature of geometrical isomerism, 87. Rotation about a double bond, 88. Modern theory of the nature of double bonds, 88. Nomenclature of geometrical isomers, 89. Determination of configuration of geometrical isomers, 91. Stereochemistry of addition reactions, 98. Stereochemistry of elimination reactions, 100. STEREOCHEMISTRY OF CYCLIC COMPOUNDS: <i>cyclo</i> Propane types, 105. <i>cyclo</i> Butane types, 107. <i>cyclo</i> Pentane types, 108. <i>cyclo</i> Hexane types; conformational analysis, 109. Fused ring systems; conformational analysis, 116.		
V. STEREOCHEMISTRY OF DIPHENYL COMPOUNDS		126
Configuration of the diphenyl molecule, 126. Optical activity of the diphenyl compounds, 127. Absolute configurations of diphenyls, 130. Other examples of restricted rotation, 130. Molecular overcrowding, 133. Racemisation of diphenyl compounds, 135. Evidence for the obstacle theory, 138. STEREOCHEMISTRY OF THE ALLENES, 139. STEREOCHEMISTRY OF THE SPIRANS, 140.		

CHAPTER		PAGE
VI.	STEREOCHEMISTRY OF SOME ELEMENTS OTHER THAN CARBON	143
	Shapes of molecules, 143. Nitrogen compounds, 143. Phosphorus compounds, 161. Arsenic compounds, 163. Antimony compounds, 169. Sulphur compounds, 169. Silicon compounds, 174. Tin compounds, 174. Germanium compounds, 174. Selenium compounds, 174. Tellurium compounds, 175.	
VII.	CARBOHYDRATES	176
	Determination of the configuration of the monosaccharides, 176. Ring structure of the monosaccharides, 181. Methods for determining the size of sugar rings, 187. Conformational analysis, 201. <i>iso</i> Propylidene derivatives of the monosaccharides, 203. Vitamin C, 208. Disaccharides, 214. Trisaccharides, 223. Polysaccharides, 224. Photosynthesis, 232. Glycosides, 234.	
VIII.	TERPENES	242
	Isoprene rule, 242. Isolation of terpenes, 244. General methods for determining structure, 244. MonoterpeneS: Acyclic monoterpeneS, 245. Monocyclic monoterpeneS, 255. Bicyclic monoterpeneS, 271. Correlation of configuration, 292. SesquiterpeneS: Acyclic sesquiterpeneS, 295. Monocyclic sesquiterpeneS, 297. Bicyclic sesquiterpeneS, 299. DITERPENEs, 308. TRITERPENEs, 318. Biosynthesis of terpeneS, 314. POLYTERPENEs: Rubber, 317.	
IX.	CAROTENOIDS	321
	Introduction, 321. CaroteneS, 321. Vitamin A, 330. Xanthophylls, 335. Carotenoid acidS, 336.	
X.	POLYCYCLIC AROMATIC HYDROCARBONS	339
	Introduction, 339. General methods of preparation, 339. BenzanthraceneS, 347. Phenanthrene derivativeS, 351.	
XI.	STEROIDS	358
	Introduction, 358. Sterols: Cholesterole, 359. Stereochemistry of the steroids, 376. Conformational analysis, 380. Ergosterol, 382. Vitamin D group, 384. Stigmasterol, 387. Biosynthesis of sterols, 389. BILE ACIDeS, 390. SEX HORMONEs: AndrogeneS, 395. OestrogeneS, 398. Gestogens, 409. ADRENAL CORTICAL HORMONEs, 415. AUXINeS, 418.	
XII.	HETEROCYCLIC COMPOUNDS CONTAINING TWO OR MORE HETERO-ATOMS	421
	Nomenclature, 421. AZOLEs: PyrazoleS, 421. ImidazoleS, 428. OxazoleS, 430. ThiazoleS, 431. TriazoleS, 433. SydnoneS, 434. TetraazoleS, 436. AZINEs: PyridazineS, 437. PyrimidineS, 438. PyrazineS, 444. BenzodiazineS, 445. OxazineS, 446. PhenoxazineS, 446. ThiazineS, 447. TriazineS and TetraazineS, 447.	
XIII.	AMINO-ACIDS AND PROTEINS	449
	Classification of amino-acidS, 449. General methods of preparation, 449. Isolation of amino-acidS, 457. General properties of amino-acidS, 458. THYROXINE, 462. PROTEINeS: General nature of proteineS, 465. Structure of proteineS, 468. PolypeptideS, 471. ENZYMEs: Nomenclature, 477. Classification, 477. Conditions for enzyme action, 478. Biosynthesis of amino-acidS and proteineS, 480.	
XIV.	ALKALOIDS	484
	Introduction, 484. Extraction of alkaloids, 484. General methods for determining structure, 485. Classification, 488. Phenylethylamine group, 489. Pyrrolidine group, 495. Pyridine group, 497. Pyrrolidine-Pyridine group, 504. Quinoline group, 520. <i>iso</i> Quinoline group, 533. Phenanthrene group, 537. Biosynthesis of alkaloids, 541.	

CHAPTER	PAGE
XV. ANTHOCYANINS	545
Introduction, 545. General nature of anthocyanins, 545. Structure of the anthocyanidins, 546. FLAVONES, 557. <i>iso</i> FLAVONES, 565. Biosynthesis of flavonoids, 566. DEPSIDES, 566.	
XVI. PURINES AND NUCLEIC ACIDS	569
Introduction, 569. Uric acid, 569. Purine derivatives, 576. Xanthine bases, 580. Biosynthesis of purines, 586. NUCLEIC ACIDS, 587.	
XVII. VITAMINS	598
Introduction, 598. Vitamin B complex, 598. Vitamin E group, 619. Vitamin K group, 623.	
XVIII. CHEMOTHERAPY	627
Introduction, 627. Sulphonamides, 627. Antimalarials, 630. Arsenical drugs, 631. ANTIBIOTICS: The Penicillins, 632. Streptomycin, 637. Aureomycin and Terramycin, 638. Patulin, 639. Chloramphenicol, 640.	
XIX. HÆMOGLOBIN, CHLOROPHYLL AND PHTHALOCYANINES	643
Introduction, 643. Hæmoglobin, 643. Biosynthesis of porphyrin, 654. Chlorophyll, 656. Phthalocyanines, 662.	
AUTHOR INDEX	667
SUBJECT INDEX	674