

## CONTENTS

LIST OF PERIODICALS . . . . .	xv
LIST OF COMMON ABBREVIATIONS AND SYMBOLS USED . . . . .	xvii

## ALIPHATIC COMPOUNDS

(Continued)

Chapter *XII*. Hydroxy- and *Amino-monocarboxylic* Acids and Related *Compounds*

by C. E. DALGLIESH, A. W. JOHNSON and L. J. HAYNES

1. Hydroxy-acids, $C_nH_{2n}(OH) \cdot CO_2H$ . . . . .	779
General Methods of Formation . . . . .	780
Methods of Preparation of $\alpha$ -Hydroxy-acids, 780—Methods of Preparation of $\beta$ -Hydroxy-acids, 781—Preparation of $\omega$ -Hydroxy-acids, 782	
General Properties and Reactions . . . . .	782
Saturated Hydroxymonocarboxylic Acids . . . . .	784
(i) $\alpha$ -Hydroxy-acids, 784; Anhydrides of $\alpha$ -Hydroxy-acids, 789; Halogen-substituted $\alpha$ -Hydroxy-acids, 791—(ii) $\beta$ -Hydroxy-acids, 792; $\beta$ -Lactones, 793—(iii) The $\gamma$ - and $\delta$ -Hydroxy-acids, and their Cyclic Esters, the $\gamma$ - and $\delta$ -Lactones, 795; General Methods of Formation, 796; $\gamma$ -Lactones, 799; $\delta$ -Lactones, 801—(iv) Higher Hydroxy-acids and Lactones, 801—(v) Amides of the Hydroxy-acids, 803—(vi) $\alpha$ -Hydroxy-iminohydrins, 804—(vii) Hydrazides and Azides of the Hydroxy-acids, 804—(viii) Nitriles of the Hydroxy-acids, 804; Nitriles of $\beta$ - and Higher Hydroxy-acids, 806	
2. Sulphur and Selenium Derivatives of Hydroxy-acids . . . . .	806
3. Nitro- and Amino-monocarboxylic Acids and Related Compounds . . . . .	810
a. Nitro-derivatives of Fatty Acids . . . . .	810
b. Nitroso-Fatty Acids. . . . .	811
c. Hydroxylamino-Fatty Acids . . . . .	811
d. Aminoxyl-Fatty Acids. . . . .	812
e. Amino-derivatives of Fatty Acids . . . . .	812
Stereochemistry and Resolution of $\alpha$ -Amino-acids, 823—(i) $\alpha$ -Amino-acids, 824—(ii) Peptides, Polypeptides and Diketopiperazines, 831—(iii) $\beta$ -Amino-acids, 836—(iv) $\gamma$ -, $\delta$ - and Higher Amino-acids, 838—(v) Lactams, 838—(vi) Other Nitrogen Derivatives of the Amino-acids, 841	
4. Unsaturated Hydroxymonocarboxylic Acids . . . . .	842
a. Hydroxyolefinecarboxylic Acids and their Lactones . . . . .	842
(i) Unsaturated Lactones with a Saturated Side Chain, 844—(ii) Saturated Lactones with Unsaturated Side Chain, 847	
h. Acetylenic Hydroxy-acids . . . . .	848

Chapter *XIII*. Aldehydo- and Keto-acids

by C. E. DALGLIESH, A. W. JOHNSON and C. BUCHANAN

1. Aldehydo-carboxylic Acids . . . . .	850
a. Saturated Aldehydo-acids, $CHO \cdot C_nH_{2n} \cdot CO_2H$ . . . . .	850

b. Unsaturated Aldehydo-acids . . . . .	853
c. Nitrogen Derivatives of the Aldehydo-acids . . . . .	854
2. Keto-carboxylic Acids . . . . .	859
a. Saturated Keto-carboxylic Acids . . . . .	859
(i) $\alpha$ -Keto-acids, $R \cdot CO \cdot CO_2H$ , 859; General Methods of Preparation, 860; Nitrogen Derivatives of the $\alpha$ -Keto-acids, 863 - (ii) $\beta$ -Keto-acids, 865; The Acetoacetic Ester Condensation, 867; Other Methods of Preparing $\beta$ -Keto-esters, 868; Reactions of Acetoacetic Ester, 870; Homologous $\beta$ -Keto-esters, 874; Halogen Substitution Products of the $\beta$ -Keto esters, 877; Nitrogen Derivatives of the $\beta$ -Keto-acids, 878 - (iii) $\gamma$ -Keto-acids, 879; Nitrogen Derivatives of the $\gamma$ -Keto-acids, 882 - (iv) 6- and Higher Keto-acids, 883	
b. Unsaturated Keto-acids . . . . .	884
(i) Ketencarboxylic Acids, 884 - (ii) Other Unsaturated Keto-acids, 885	

## Chapter XIV. Carbonic Acid and its Derivatives

by I. D. MORTON and E. HOGGARTH

1. Carbonic Acid and its Esters . . . . .	886
a. Esters of Carbonic Acid . . . . .	888
b. Derivatives of Orthocarbonic Acid . . . . .	889
(i) Esters, 889 - (ii) Tetrahalogen Substitution Products of Methane, 889 - (iii) Nitro-derivatives of Orthocarbonic Acid, 890	
2. Chlorides of Carbonic Acid . . . . .	891
a. Chloroformic Esters . . . . .	891
b. Carbonyl Halides . . . . .	892
3. Sulphur Derivatives of Carbonic Acid . . . . .	893
a. Carbon Oxysulphide and Carbon Disulphide . . . . .	894
b. Thiocarbonic Acids . . . . .	895
(i) Monothiocarbonic Acids, 896 - (ii) Dithiocarbonic Acids, 896 - (iii) Trithiocarbonic Acid, 898	
c. Chlorides of the Thiocarbonic Acids . . . . .	898
d. Sulphur Derivatives of Orthocarbonic Acid. . . . .	899
4. Amides of Carbonic Acid . . . . .	899
a. Carbamic Acid Derivatives . . . . .	899
(i) Urethanes, Alkyl Carbamates, 900 - (ii) Carbamic Acid Chlorides, "Urea Chlorides", 905	
b. Urea and its Derivatives . . . . .	905
c. Derivatives of Iminodicarboxylic and Nitrilotricarboxylic Acid . . . . .	914
d. Derivatives of Iminocarbonic Acid and <i>iso</i> Urea . . . . .	916
e. Hydrazine-, Azine- and Azido-derivatives of Carbonic Acid. . . . .	917
f. Hydroxylamine Derivatives of Carbonic Acid . . . . .	920
g. Sulphur Derivatives of Carbamic Acid and Urea . . . . .	921
(i) Sulphur Derivatives of Carbamic Acid, 921 - (ii) Thiourea, <i>iso</i> Thiourea and their Derivatives, 924 - (iii) Hydrazine Derivatives of Thiocarbonic Acid, 928	
5. Guanidine and its Derivatives . . . . .	929
6. Nitriles and Imides of Carbonic and Thiocarbonic Acids . . . . .	937
a. Cyanic Acid and its Derivatives . . . . .	937
(i) Esters of Cyanic Acid, 939 - (ii) Cyanogen halides, 940	
b. Sulphur Compounds of Cyanogen . . . . .	941
(i) Thiocyanic Acid, 941 - (ii) Alkyl Thiocyanates, Esters of Thiocyanic Acid, $R \cdot S \cdot CN$ , 943 - (iii) Alkyl <i>iso</i> Thiocyanates, Esters of <i>iso</i> Thiocyanic Acid, $RN:C:S$ , 945	

c. Cyanamide and its Derivatives . . . . .	947
d. Derivatives of Carbodi-imide . . . . .	949

### Chapter XV. Dicarboxylic Acids

by C. E. DALGLIESH, A. W. JOHNSON and C. BUCHANAN

1. Paraffindicarboxylic Acids, $C_nH_{2n}(CO_2H)_2$ , . . . . .	950
General Methods of Preparation . . . . .	951
a. Oxalic Acid and its Derivatives . . . . .	953
b. The Malonic Acid Group . . . . .	961
(i) Malonic Acid and its Derivatives, 961 - (ii) Substituted Malonic Acids, 965 - (iii) Alkylmalonic Acids, 966	
c. The Succinic Acid Group . . . . .	967
(i) Succinic Acid and its Derivatives, 968 - (ii) Monoalkylsuccinic Acids, 970 - (iii) Dialkylsuccinic Acids, 972 - (iv) Anhydrides of the Succinic Acid Group, 974 - (v) Nitrogen-containing Derivatives of Succinic Acid and Higher Dicarboxylic Acids, 974 - (vi) Halogen Substitution Products of the Succinic Acid Group, 977	
d. The Glutaric Acid Group . . . . .	979
e. Adipic Acid and Higher Dicarboxylic Acids and their Derivatives . . . . .	981
2. Olefinedicarboxylic Acids, $C_nH_{2n-4}O_4$ . . . . .	987
a. Malonic Acid Derivatives . . . . .	987
b. Unsaturated Dicarboxylic Acids in Which the Carboxyl Groups are Attached to Different Carbon Atoms . . . . .	988
(i) Fumaric and Maleic Acids, 989; Reactions of Fumaric and Maleic Acids, 992; Interconversion of Fumaric and Maleic Acids, 993; The Isomerism of Fumaric and Maleic Acids, 993 - (ii) Acids, $C_3H_4(CO_2H)_2$ and their Alkyl Substitution Products, 995 - (iii) Higher Olefinedicarboxylic Acids, 1006	
3. Diolefinedicarboxylic Acids . . . . .	1007
4. Polyolefinedicarboxylic Acids . . . . .	1009
5. Acetylene- and Polyacetylene-dicarboxylic Acids . . . . .	1010

### Chapter XVI. Trihydric Alcohols and Their Oxidation Products:

#### Trihydric Alcohols to Triketones

by C. E. DALGLIESH, A. G. LONG and G. J. TYLER

1. Trihydric Alcohols and their Derivatives . . . . .	1012
a. Glycerol, 1:2:3-Propanetriol . . . . .	1013
b. Alkyl-substituted Derivatives of Glycerol . . . . .	1016
(i) Monoalkyl Derivatives of Glycerol, 1016 - (ii) Dialkyl Derivatives of Glycerol, 1017 - (iii) Trialkyl Derivatives of Glycerol, 1017 - (iv) Tetraalkyl Derivatives of Glycerol, 1018	
c. Triprimary Glycerols, $RC(CH_2OH)_3$ . . . . .	1018
d. Other Triols . . . . .	1018
e. Glycerol Esters of Inorganic Acids . . . . .	1018
(i) Halogen Esters, 1018 - (ii) Esters of Nitric Acid, 1020 - (iii) Esters of Other Inorganic Acids, 1021	
f. Glycerol Esters of the Fatty Acids: Glycerides. . . . .	1023
(i) Esters of Formic Acid, 1024 - (ii) Esters of Acetic Acid, Acetins, 1024 - (iii) Butyrins, 1024 - (iv) Glycerides of Higher Fatty Acids, 1024; Synthesis of Glycerides, 1025	

g. Glycerol Ethers . . . . .	1029
h. Cyclic Ethers. Acetals and Ketals . . . . .	1031
i. Glycide Compounds . . . . .	1032
j. Sulphur Derivatives of Glycerol . . . . .	1034
k. Nitrogen Derivatives of Trihydric Alcohols . . . . .	1035
2. Dihydroxy-aldehydes . . . . .	1036
3. Dihydroxy-ketones . . . . .	1039
4. Hydroxy-dialdehydes . . . . .	1041
5. Hydroxyaldehyde-ketones . . . . .	1043
6. Hydroxy-diketones . . . . .	1043
7. Dialdehyde-ketones . . . . .	1044
8. Aldehyde-diketones . . . . .	1045
9. Triketones . . . . .	1045

**Chapter XVII. Trihydric Alcohols and Their Oxidation Products (continued):  
Dihydroxycarboxylic Acids to Tricarboxylic Acids**

by C. E. DALGLIESH, A. W. JOHNSON, A. G. LONG and G. J. TYLER

1. Dihydroxy-acids and Related Compounds . . . . .	1048
a. Dihydroxycarboxylic Acids . . . . .	1048
b. Anhydrides of the Dihydroxy-acids . . . . .	1064
(i) Epoxy-acids, 1064 - (ii) Hydroxylactones, 1066	
c. Aminohydroxycarboxylic Acids . . . . .	1067
d. Aminothiocarboxylic Acids . . . . .	1073
e. Diaminocarboxylic Acids . . . . .	1079
2. Hydroxyaldehydicarboxylic Acids and Hydroxyketocarboxylic Acids	1083
3. Dialdehydicarboxylic Acids . . . . .	1090
4. Aldehydeticarboxylic Acids . . . . .	1091
5. Diketocarboxylic Acids . . . . .	1093
6. Hydroxydicarboxylic Acids . . . . .	1098
a. Saturated Acids $C_nH_{2n-1}(OH)(CO_2H)_2$ , . . . . .	1098
(i) Hydroxymalonic Acid Group, 1098 - (ii) Hydroxysuccinic Acid Group, 1101; Aminosuccinic Acids, 1106; Homologues of Malic Acid, 1109; Paraconic Acids, 1111 - (iii) Hydroxyglutaric Acid Group, 1114; Homologues of Hydroxyglutaric Acids, 1119 - (iv) Higher Hydroxydicarboxylic Acids, 1120	
b. Unsaturated Hydroxydicarboxylic Acids . . . . .	1121
7. Aldehydicarboxylic Acids . . . . .	1124
8. Ketodicarboxylic Acids . . . . .	1126
a. Saturated Ketodicarboxylic Acids . . . . .	1126
(i) Ketomalonic Acid Group, 1126 - (ii) Ketosuccinic Acid Group, 1129 - (iii) Ketoglutaric Acid Group, 1138 - (iv) Higher Ketodicarboxylic Acids, 1143	
b. Unsaturated Ketodicarboxylic Acids . . . . .	1146
9. Tricarboxylic Acids . . . . .	1146
a. Saturated Tricarboxylic Acids . . . . .	1146
(i) Tricarboxylic Acids with Two or Three Carboxyl Groups Attached to the Same Carbon Atom, 1146 - (ii) Tricarboxylic Acids with the Carboxyl Groups Attached to Three Different Carbon Atoms, 1150	
b. Olefinetricarboxylic Acids . . . . .	1152

*Chapter XVIII. Tetrahydric Alcohols and Their Oxidation Products*by *L. J. HAYNES*

1. Tetrahydric Alcohols . . . . .	1155
a. The Tetrityls . . . . .	1155
b. Halogen Esters of the Tetrityls . . . . .	1157
c. Homologous Tetrahydric Alcohols. . . . .	1159
d. Nitrogen Derivatives of Tetrahydric Alcohols . . . . .	1159
2. Trihydroxyaldehydes . . . . .	1160
3. Trihydroxyketones . . . . .	1160
4. Dihydroxydialdehydes . . . . .	1162
5. Dihydroxydiketones . . . . .	1162
6. Dihydroxyketoaldehydes . . . . .	1162
7. Hydroxytriketones . . . . .	1162
8. Tetraketones . . . . .	1162
g. Trihydroxycarboxylic Acids . . . . .	1163
10. Dihydroxyaldehydocarboxylic Acids . . . . .	1165
11. Dihydroxyketocarboxylic Acids . . . . .	1165
12. Hydroxydiketocarboxylic Acids . . . . .	1166
13. Triketocarboxylic Acids . . . . .	1166
14. Dihydroxydicarboxylic Acids . . . . .	1166
a. Saturated Dihydroxydicarboxylic Acids . . . . .	1166
(i) Malonic Acid Derivatives, 1166 - (ii) Succinic Acid Derivatives, 1167 -	
(iii) Glutaric Acid Derivatives, 1175 - (iv) Adipic Acid Derivatives, 1176	
- (v) Derivatives of Pimelic Acid and Higher Homologues, 1177	
b. Dihydroxyolefinedicarboxylic Acids . . . . .	1178
15. Hydroxyketodicarboxylic Acids . . . . .	1179
16. Diketodicarboxylic Acids. . . . .	1180
17. Hydroxytricarboxylic Acids . . . . .	1186
The Citric Acid Cycle. 1188	
18. Ketotricarboxylic Acids . . . . .	1191
19. Tetracarboxylic Acids . . . . .	1192
a. Paraffintetracarboxylic Acids . . . . .	1192
(i) All Carboxyl Groups Attached to the Same Carbon Atom, 1192 -	
(ii) Carboxyl Groups Attached to Two Different Carbon Atoms, 1193 -	
(iii) Carboxyl Groups Attached to Three Different Carbon Atoms, 1194 -	
(iv) Carboxyl Groups Attached to Four Different Carbon Atoms, 1195	
b. Olefintetracarboxylic Acids . . . . .	1195

*Chapter XIX. Pentahydric Alcohols and Their Oxidation Products*by *J. K. N. JONES*

1. Pentahydric Alcohols . . . . .	1197
a. Pentitols . . . . .	1197
b. Methylpentitols; Monodeoxyhexitols . . . . .	1198
2. Tetrahydroxyaldehydes or Aldopentoses . . . . .	1199
a. Aldopentoses. Carbohydrates $C_5H_{10}O_5$ . . . . .	1199
b. Methylaldopentoses. Carbohydrates $C_6H_{12}O_5$ . . . . .	1207
Sugars Associated with the Steroid Heart Poisons. 1211	

3. Tetrahydroxyketones or Ketopentoses, $C_5H_{10}O_5$ . . . . .	1212
a. 1:3:4:5-Tetrahydroxy-2-ketopentanes . . . . .	1212
b. 1:3:4:5-Tetrahydroxy-2-ketohexanes . . . . .	1213
c. 1:2:3:4-Tetrahydroxy-5-ketohexanes . . . . .	1214
d. 1:2:3:5-Tetrahydroxy-4-ketohexanes . . . . .	1214
4. Deoxypentose Sugars, $C_5H_{10}O_4$ . . . . .	1214
5. Glycols, $C_5H_8O_3$ . . . . .	1215
6. Trihydroxydialdehydes and Trihydroxyketoaldehydes . . . . .	1216
a. Trihydroxydialdehydes . . . . .	1216
b. Trihydroxyketoaldehydes; osones . . . . .	1217
7. Tetrahydroxymonocarboxylic Acids . . . . .	1218
8. Trihydroxyaldehydocarboxylic Acids . . . . .	1220
g. Trihydroxydicarboxylic Acids. . . . .	1221
10. Dihydroxyketodicarboxylic Acids . . . . .	1221
11. Triketodicarboxylic Acids . . . . .	1222
12. Dihydroxytricarboxylic Acids. . . . .	1222
13. Penta- and Higher Carboxylic Acids . . . . .	1223
14. Olefinepolycarboxylic Acids . . . . .	1223

*Chapter XX. Hexa- and Poly-hydric Alcohols and Their Oxidation Products,  
Carbohydrates and Related Compounds*

by J. K. N. JONES

1. Polyhydric Alcohols . . . . .	1224
a. Hexahydric Alcohols . . . . .	1224
(i) Hexitols, 1224- (ii) Amino-alcohols. Glycamines, 1229	
b. Heptahydric Alcohols, Heptitols . . . . .	1230
2. Penta-, Hexa-, Hepta- and Octa-hydroxy-aldehydes and -ketones. 1230	
Nomenclature in Carbohydrate Chemistry . . . . .	1232
a. Pentahydroxyaldehydes and Pentahydroxyketones, Hexoses, 1233	
Monoses . . . . .	1233
Synthetic and Degradation Reactions of the Hexoses, 1239 - The Separation and Identification of the Sugars, 1241 - Constitution of the Hexoses, 1242 - (i) Aldoheoses, 1247; Synthesis of D-Glucose, D-Fructose and D-Mannose, 1250; Properties and Derivatives of the Aldoheoses, 1251 - (ii) Keto-hexoses, 1257 - (iii) Aminohexoses, 1260- (iv) Hexals, Glycols, $C_6H_{10}O_4$ , 1262 - (v) Hexoseens, $C_6H_{10}O_5$ , 1264	
b. Heptoses . . . . .	1264
(i) Aldoheptoses, 1265 - (ii) Ketoheptoses, 1265	
c. Octoses . . . . .	1266
d. Nonoses and Decoses . . . . .	1266
3. Tetrahydroxyketoaldehydes . . . . .	1266
a. Glycosones $C_6H_{10}O_6$ . . . . .	1266
b. 5-Ketohexoses . . . . .	1267
4. Hexaketones . . . . .	1267
5. Polyhydroxymonocarboxylic Acids (Aldonic Acids) . . . . .	1267
a. Pentahydroxymonocarboxylic Acids, $C_6H_{12}O_7$ . . . . .	1267
b. Heptonic Acids, $C_7H_{14}O_8$ . . . . .	1272
c. Octonic, Nononic and Deconic Acids . . . . .	1272
6. Dehydrohexonic Acids, $C_6H_8O_6$ , and Their Analogues. Ascorbic Acids 1273	

7. Tetrahydroxyaldehydocarboxylic Acids and Tetrahydroxyketocarboxylic Acids . . . . .	1277
a. Uronic Acids, $C_6H_{10}O_7$ . . . . .	1277
b. Tetrahydroxyketocarboxylic Acids, Ketohectic Acids, $C_6H_{10}O_7$ . . . . .	1280
8. Polyhydroxydicarboxylic Acids . . . . .	1281
a. Tetrahydroxydicarboxylic Acids, Saccharic Acids, $C_6H_{10}O_8$ . . . . .	1281
b. Pentahydroxydicarboxylic Acids . . . . .	1284
9. Tetraketodicarboxylic Acids . . . . .	1284
10. Triketotricarboxylic Acids . . . . .	1285
11. Hydroxyketotetracarboxylic Acids . . . . .	1285
12. Diketotetracarboxylic Acids . . . . .	1286
13. Hexacarboxylic Acids . . . . .	1286

*Chapter XXI. Complex Carbohydrates: Oligosaccharides and Polysaccharides*

by E. G. V. PERCIVAL

I. Oligosaccharides . . . . .	1287
a. Disaccharides . . . . .	1287
Constitution and Classification, 1287 - (i) Hexosidotetroses, $C_{10}H_{18}O_9$ , 1290 - (ii) Pentosidohexoses, $C_{11}H_{20}O_{10}$ , 1290 - (iii) Hexosidopentoses, $C_{11}H_{20}O_{10}$ , 1290 - (iv) Deoxyhexosidohexose (methylpentosidohexose) $C_{12}H_{22}O_{10}$ , 1291 - (v) Hexosidohexoses, $C_{12}H_{22}O_{11}$ , Reducing Type, 1291 [1. Glucosidoglucoses, 1291 - 2. Galactosidoglucoses, 1296 - 3. Glucosidomannoses, Galactosidogalactoses and Galactosidomannoses, 1298 - 4. Glycosidofructoses, 1298] - (vi) Hexosidohexoses, Non-Reducing Type, 1299 [1. Glucosidoaldosides, 1299 - 2. Glucosidoketosides, 1300]	
b. Trisaccharides $C_{18}H_{32}O_{16}$ . . . . .	1302
(i) Reducing Trisaccharides, 1302 - (ii) Non-Reducing Trisaccharides, 1304	
c. Tetrasaccharides $C_{24}H_{44}O_{21}$ . . . . .	1305
2. Polysaccharides . . . . .	1306
a. Pentosans . . . . .	1307
b. Hexosans . . . . .	1308
(i) Polysaccharides Derived from D-Glucose, 1308 - (ii) Polysaccharides Derived from Fructose. Fructosans, 1318 - (iii) Mannans, 1321 - (iv) Galactans, 1321	
c. Polyuronides . . . . .	1322
d. Complex Polysaccharides . . . . .	1323
(i) Neutral Group, 1323 - (ii) Acidic Group, 1324	

*Chapter XXII. Proteins*

by KENNETH BAILEY

Introduction . . . . .	1327
1. The Amino-Acid Constituents of Proteins . . . . .	1327
2. General Properties of Proteins . . . . .	1329
3. Classification of Proteins . . . . .	1331
(i) Classification as Native and Derived Proteins, 1331 - (ii) Classification According to Types, 1332	
4. Amino-Acid Composition of Proteins . . . . .	1333
The Newer Methods of Amino-Acid Analysis, 1334 - The Formulation of Analytical Results, 1337	

5. Physico-chemical Properties of Proteins . . . . .	1339
The Properties of Proteins Depending on Their Amphoteric Character, 1341	
- Molecular Weight and Shape of Proteins, 1343 - Other Methods for	
Determining Molecular Weight, 1346 - Electrophoresis of Proteins, 1347	
6. The Essentials of Protein Structure . . . . .	1348
a. The Structure of Fibrous Proteins . . . . .	1350
(i) Keratins and Related Proteins, 1350 - (ii) Collagen, 1354	
b. The Structure of Corpuscular Proteins . . . . .	1356
7. Addendum . . . . .	1357

*Chapter XXIII. Enzymes*

*by M. STACEY*

Introduction . . . . .	1358
1. Nomenclature and Classification . . . . .	1360
2. Nature and Properties of Enzymes . . . . .	1365
a. Specificity of Enzyme Action . . . . .	1367
b. Influence of Physical and Chemical Factors on Enzyme Action . . . . .	1369
(i) Temperature, 1369 - (ii) The Effect of pH, 1370 - (iii) The Effect of	
Physical Agents on Enzymes, 1372 - (iv) The Effect of Chemical Agents.	
"Zymogens and Kinases", 1373 - (v) Anti-Enzymes, 1374	
3. Preparation and Purification of Enzymes . . . . .	1374
4. Properties of Some Individual Enzymes . . . . .	1375
a. The Iron-Containing Enzymes . . . . .	1375
b. Dehydrogenases Containing Coenzymes 1 and 2 . . . . .	1377
c. The Yellow Enzymes . . . . .	1379
d. Proteinases and Peptidases . . . . .	1380
e. Miscellaneous Types . . . . .	1381
f. Carbohydrases . . . . .	1382
g. Nucleases, Amidases and Deaminases . . . . .	1387
5. Miscellaneous . . . . .	1388
a. Enzymes and Chemotherapy . . . . .	1388
b. Industrial Uses of Enzymes . . . . .	1389
c. Enzymes in Carbohydrate Metabolism . . . . .	1389
<b>INDEX . . . . .</b>	<b>1393</b>