

CONTENTS

Introduction to the Series	iii
Preface	v
 PART ONE Introduction	 1
 Chapter 1 THEORY AND INSTRUMENTATION	 3
I. General Comments	4
II. Absorption of Light	5
III. Colorimetric Determinations	10
IV. Fluorescence	13
V. Fluorimetric Determinations	17
VI. Instrumentation	22
References	34
 PART TWO Practical Methods According to Functional Groups	 37
 Chapter 2 ALCOHOLS	 39
I. Introduction	39
II. Alcohols	41
III. Primary and Secondary Alcohols	47
IV. Primary Alcohols	51
V. Secondary Alcohols	54
VI. Tertiary Alcohols	56
VII. 1,2-Diols	57
VIII. Hexitols	59
IX. α -Amino Primary Alcohols	61
X. 2-Hydroxy-1-carboxylic Acids	61
XI. 2,3-Dihydroxy-1-carboxylic Acids	62
XII. Alcohols (F)	64
XIII. Primary Alcohols (F)	66
XIV. 1,2-Diols (F)	68
XV. Hexitols (F)	69

XVI. α -Amino Primary Alcohols (F)	70
XVII. 2,3-Dihydroxy-1-carboxylic Acids (F)	70
References	72
 Chapter 3 PHENOLS	 75
I. Introduction	75
II. Phenols	78
III. p-Substituted Phenols	101
IV. o-Diphenols	104
V. m-Diphenols	105
VI. 1,2,3-Triphenols	108
VII. Phenols (F)	109
References	110
 Chapter 4 ALIPHATIC AMINES	 115
I. Introduction	115
II. Aliphatic Amines and Quaternary Ammonium Compounds	120
III. Aliphatic Amines	122
IV. Primary and Secondary Aliphatic Amines	128
V. Secondary and Tertiary Aliphatic Amines	139
VI. Primary Aliphatic Amines	144
VII. Secondary Aliphatic Amines	157
VIII. Tertiary Aliphatic Amines	161
IX. Quaternary Ammonium Compounds	168
X. Aliphatic Amines (F)	169
XI. Primary and Secondary Aliphatic Amines (F)	170
XII. Primary Aliphatic Amines (F)	175
XIII. Tertiary Aliphatic Amines (F)	179
References	181
 Chapter 5 AROMATIC AMINES	 187
I. Introduction	187
II. Aromatic Amines	190
III. Primary and Secondary Aromatic Amines	197
IV. Primary Aromatic Amines	198
V. Primary Aromatic Amines (F)	211
References	214
 Chapter 6 GUANIDINES AND UREAS	 217
I. Introduction	217
II. Monosubstituted Guanidines	218
III. Monosubstituted Ureas	221

IV. Guanidine, Mono- and N,N-Disubstituted Guanidines (F)	222
V. Guanidine and Monosubstituted Guanidines (F)	222
VI. Urea and Monosubstituted Ureas (F)	225
VII. N,N'-Disubstituted Ureas (F)	227
VIII. N,N'-Disubstituted Thioureas (F)	229
References	230
 Chapter 7 MISCELLANEOUS NITROGEN DERIVATIVES	 233
I. Introduction	233
II. Aliphatic Nitro Compounds	235
III. Primary and Secondary Aliphatic Nitro Compounds	236
IV. Primary Aliphatic Nitro Compounds	237
V. Aliphatic 2-Nitro-1-hydroxy Compounds	239
VI. Aromatic Nitro Compounds	240
VII. Aromatic Dinitro Compounds	244
VIII. Nitriles	245
IX. Mono- and N,N-Disubstituted Hydrazines (F)	247
X. Aliphatic 2-Nitro-1-hydroxy Compounds (F)	249
XI. Nitriles (F)	250
References	251
 Chapter 8 CARBONYL COMPOUNDS	 253
I. Introduction	253
II. Aldehydes and Ketones	255
III. Aldehydes	261
IV. Aliphatic Aldehydes	263
V. 2,3-Unsaturated Aldehydes	270
VI. Aromatic Aldehydes	272
VII. Ketones	274
VIII. α -Methylene Ketones	276
IX. β -Diketones	279
X. p-Quinones	280
XI. Aliphatic Aldehydes (F)	283
XII. α -Methylene Aldehydes (F)	284
XIII. Dialkyl α -Methylene Ketones (F)	286
References	288
 Chapter 9 CARBOXYLIC ACIDS AND DERIVATIVES	 291
I. Introduction	291
II. Carboxylic Acids	294
III. Fatty Acids	301
IV. 2-Hydroxy-1-carboxylic Acids	302

V. 2,3-Dihydroxy-1-carboxylic Acids	303
VI. α -Amino Acids	305
VII. Anhydrides and Lactones	314
VIII. Carboxylic Esters	316
IX. Amides	319
X. 2,3-Dihydroxy-1-carboxylic Acids (F)	320
XI. α -Amino Acids (F)	322
XII. α -Keto Acids (F)	324
References	325
 Chapter 10 PEROXIDES	 329
I. Introduction	329
II. Miscellaneous Peroxides	330
III. Peracids, Acyl and Aroyl Peroxides	331
IV. Hydroperoxides and Peracids	332
References	336
 Chapter 11 gem-POLYHALOGEN COMPOUNDS AND THIOLS	 339
I. Introduction	339
II. gem-Polyhalogen Compounds	340
III. Thiols	342
IV. gem-Polyhalogen Compounds (F)	349
V. Thiols (F)	351
References	352
 Chapter 12 UNSATURATED COMPOUNDS	 355
I. Introduction	355
II. Ethylenic Compounds of the Type $R-CH=C$	356
III. Ethylenic Compounds of the Type $R-CH=CH_2$	358
IV. Aromatic Compounds	361
V. Ethylenic Compounds of the Type $R-CH=CH_2$ (F)	367
References	368
 Chapter 13 NITROGEN-CONTAINING HETEROCYCLIC COMPOUNDS	 371
I. Introduction	371
II. Miscellaneous N-Heterocyclic Derivatives	373
III. Indole Derivatives	375
IV. Pyridine Derivatives	379
V. Imidazole Derivatives	383
VI. Imidazoline Derivatives	385
VII. 2-Substituted Pyrimidine Derivatives	386

VIII. Barbiturates	387
IX. Phenothiazine Derivatives	388
X. Indole Derivatives (F)	391
XI. Pyridine Derivatives (F)	392
XII. Phenothiazine Derivatives (F)	394
References	395
 Chapter 14 SUGARS AND DERIVATIVES	 399
I. Introduction	399
II. Aldoses and Ketoses	405
III. Aldoses	414
IV. Ketoses	415
V. Tetroses	418
VI. Pentoses	419
VII. Methylpentoses	425
VIII. Hexoses	425
IX. 2-Deoxyoses	428
X. 2-Amino-2-deoxyhexoses	438
XI. Hexuronic Acids	446
XII. Aldoses (F)	447
XIII. Ketoses (F)	448
XIV. Pentoses (F)	449
XV. 2-Deoxyoses (F)	451
XVI. 2-Amino-2-deoxyhexoses	452
XVII. Hexuronic Acids (F)	454
References	454
 Chapter 15 STEROIDS	 461
I. Introduction	461
II. Hydroxysteroids	469
III. 3-Hydroxysteroids	472
IV. Ketosteroids	473
V. 3- or 17-Ketosteroids	476
VI. 3-Ketosteroids	484
VII. 3-Ketosteroids with Unsaturated Ring A	486
VIII. Δ^1 - or Δ^4 - or $\Delta^{1,4}$ - or $\Delta^{4,6}$ -3-Ketosteroids	490
IX. Δ^4 - or $\Delta^{1,4}$ -3-Ketosteroids	492
X. Δ^4 -3-Ketosteroids	493
XI. Δ^5 (10) -3-Keto-19-norsteroids	496
XII. 17-Ketosteroids (Free or Esterified)	498
XIII. 17-Ketosteroids (Free)	503
XIV. 17-Hydroxy-17-ketosteroids	505
XV. Hydroxysteroids (F)	510
XVI. Δ^4 - or $\Delta^{1,4}$ -3,11-Diketosteroids (F)	510
XVII. Δ^5 (10) -3-Keto-19-norsteroids (F)	511
XVIII. 17-Ketosteroids (Free) (F)	513
References	514

PART THREE	519
Chapter 16 ADDITIONAL PRACTICAL HINTS	521
I. Diazo Coupling and Diazonium Salts	521
II. Development of Aromatic Nitro Compounds	532
III. 3-Methylbenzothiazolin-2-one Hydrazone	536
IV. Periodates and Periodate Oxidation	540
V. Colorimetric and Fluorimetric Determinations of Formaldehyde	544
VI. Janovsky and Zimmermann Reactions	550
VII. 1,2-Naphthoquinone-4-sulfonic Acid	555
VIII. Tetrazolium Salts and Formazans	559
IX. Determinations through the Hantzsch Reaction	566
X. Ninhydrin	568
XI. Determinations through Opening of the Pyridine Ring	577
References	585
Chapter 17 SYNTHESSES OF REAGENTS AND STANDARDS. PURIFICATION OF SOLVENTS.	605
I. Syntheses of Reagents	605
II. Syntheses of Fluorescence Standards	613
III. Note on Benzyltrimethylammonium Hydroxide	615
IV. Purification of Solvents	615
References	618
PART FOUR Appendix	621
MISCELLANEOUS TABLES FOR PRACTICAL USERS	623
I. Buffers	623
II. Fluorescence Standards Comparisons	631
References	636
AUTHOR INDEX	637
SUBJECT INDEX	657