

## CONTENTS

|  |       |
|--|-------|
| Introduction   | 17    |
| <b>GENERAL PART</b>  |       |
| General Reviews and Books  | 23    |
| Books on Chromatography (including Paper Chromatography) (1-14)                                    | 23    |
| Books on Paper Chromatography (15-28)  | 23-24 |
| General Reviews on Paper Chromatography (29-48)  | 24-25 |
| Reviews on the Application in Various Fields of Science and Technology (49-74)                     | 25-26 |
| Principles, Theory and Information of General Interest in Paper Chromatography                     | 27    |
| Mechanism of Paper Chromatography (75-77)  | 27    |
| Chromatographic Development (78-105)   | 27-28 |
| Relations Between Chemical Structure and Chromatographic Behaviour of Organic Substances (106-124) | 29-30 |
| The Effect of Dissociation (125-130)   | 30    |
| Resolution of Optical Antipodes (131-133)  | 30    |
| Techniques of Paper Chromatography   | 31    |
| Preparation of Sample (134-138)  | 31    |
| Desalting (139-143)  | 31    |
| Application of Samples (144-169)   | 31-33 |
| Chromatographic Paper  | 33    |
| Properties, Purification and Applicability (170-176)   | 33    |
| Chemically Modified Paper (178-191)  | 33-34 |
| Sheets of Materials Containing no Cellulose (192-199)  | 34    |
| Development  | 35    |
| Special Shapes of Chromatographic Paper (200-205)  | 35    |
| Solvent Systems  | 35    |
| Choice of Solvent Systems (206-214)  | 35-36 |
| Gradient Elution (215-216)   | 36    |
| Impregnation of Paper (217-224)  | 36    |
| Chromatographic Tanks (225-243)  | 36-37 |
| Ascending Development (244-251)  | 37-38 |
| Papers of Conical and Spiral Shapes (252-254)  | 38    |
| Circular and Sector Paper Chromatography (Radial Development) (255-269)                            | 38-39 |
| Development in Centrifugal Field (270-277)   | 39    |
| Other Methods Using Horizontal Development (278-282)   | 39    |
| Combinations with Electrophoresis (283-287)  | 39-40 |
| Continuous Chromatography (288)  | 40    |

|   |       |
|---|-------|
| Two-dimensional Techniques (289—295).....   | 40    |
| “Automation” of Development (296—300) .....   | 40—41 |
| Measurements of $R_F$ -Values (301—303) .....   | 41    |
| Detection and Determination of Substances Resolved .....  | 41    |
| Drying of Chromatograms (304—307) .....   | 41    |
| Generally Applicable Chemical Detection Methods (308—321) ..  | 41—42 |
| Direct Determination on Chromatograms (in situ) by means of<br>Visual Estimation, on the Basis of the Area of the Spot etc. (322—<br>327) ..... | 42    |
| Optical Detection and Estimation Methods .....  | 42    |
| Detection by Means of Absorption, Reflection, and Fluores-<br>cence; Photography of Chromatograms (328—338) .....                               | 42—43 |
| Photometry in Transmitted Light (339—353) .....   | 43—44 |
| Investigation of Spectra Directly on Paper (in situ) (354—359)  | 44    |
| Direct Photometry of Reflected Light (360—365) .....  | 44    |
| Photometry of Photographs (366—372) .....   | 45    |
| Direct Fluorimetry on Paper (in situ) (373) .....   | 45    |
| Electrochemical Methods of Detection and Determination (374—<br>384) .....  | 45—46 |
| Biological Methods of Detection and Determination .....   | 46    |
| Microbiological Methods (385—391) .....   | 46    |
| Methods Using Higher Plants (392—400) .....   | 46—47 |
| Methods Using Animals (401—410) .....   | 47    |
| Preparative Chromatography .....  | 48    |
| Elution from Paper (411—418) .....  | 48    |
| Preparative Techniques on Single Sheets of Paper (419—420).....   | 48    |
| Chromatopile and Related Methods (421) .....  | 49    |
| Filter Paper Roll Columns (and Chromatopack) (422—427) .....  | 49    |

## SPECIAL PART

|  |       |
|--|-------|
| Hydrocarbons .....   | 53    |
| Aliphatic Hydrocarbons and Their Halogen Derivatives (428—430) | 53    |
| Cyclic Hydrocarbons .....                                      | 53    |
| Techniques (431—446) .....                                     | 53—54 |
| Application (447—461) .....                                    | 54    |
| Alcohols .....   | 55    |
| Lower Aliphatic Alcohols (462—480) .....                       | 55—56 |
| Higher Aliphatic Alcohols (481—486) .....                      | 56    |
| Glycols (487—501) .....  | 57    |
| Cyclic Alcohols (502—509) .....                                | 58    |
| Cyclitols (510—523) .....                                      | 58—59 |
| Phenols .....  | 60    |
| Techniques (524—564) .....                                     | 60—62 |
| Phenolic Glycosides (565—584) .....                            | 62—63 |
| Antioxidants and Food Preservatives (585—594) .....            | 63—64 |
| Applications .....   | 64    |
| Phenols in Microorganisms and Plants (595—614) .....           | 64—65 |
| Phenols in Animal Materials (615—633) .....                    | 65—66 |
| Other Applications (634—653) .....                             | 66—67 |
| Compounds Containing Heterocyclic Oxygen .....                 | 68    |
| Coumarins (654—696) .....                                      | 68—70 |

|   |         |
|---|---------|
| Derivatives of $\gamma$ -Pyrone (Chromones, Flavones, Aurones etc.) (697—814)   | 70—75   |
| Anthocyanins and Anthocyanidins (815—873a) .....  | 75—78   |
| Catechins (874—902) .....   | 78—79   |
| Other Oxygen-Containing Heterocyclic Compounds (903—924) .....  | 80      |
| Oxo Compounds .....   | 81      |
| Aliphatic Aldehydes and Ketones .....   | 81      |
| Techniques (925—950) .....  | 81—82   |
| Applications (951—987) .....  | 82—84   |
| Cyclic Aldehydes and Ketones .....  | 84      |
| Techniques (988—1006) .....   | 84—85   |
| Applications in the Chemistry of Lignin (1007—1019) .....   | 85—86   |
| Other Applications (1020—1037) .....  | 86—87   |
| Quinones .....  | 87      |
| Derivatives of Benzoquinone and Naphthoquinone (1038—1054) ..   | 87—88   |
| Anthraquinones (1055—1082) .....  | 88—89   |
| Carbohydrates .....   | 90      |
| Reviews (1083—1087) .....   | 90      |
| Techniques .....  | 90      |
| Relations between Structure and $R_F$ Values (1088—1090) .....  | 90      |
| Preparation of Samples (1091—1095) .....  | 90—91   |
| Detection (1096—1119) .....   | 91—92   |
| Solvent Systems (1120—1136) .....   | 92—93   |
| Determination of Carbohydrates Directly on Paper (1137—1147) ..   | 93      |
| Determination of Carbohydrates after Elution from Paper (1148—1167) .....   | 93—94   |
| Applications .....  | 94      |
| Bound Carbohydrates in Microorganisms (1168—1206) .....   | 94—96   |
| Applications to Vegetable Material .....  | 96      |
| Free Mono- and Disaccharides (1207—1255) .....  | 96—99   |
| Analysis of Carbohydrates Formed by Hydrolysis of Plant Material Containing Mostly Polysaccharides (1256—1302) .....                            | 99—101  |
| Carbohydrate Components of Plant Heteroglycosides (1303—1312)   | 101—102 |
| Applications to Animal Material .....   | 102     |
| Free Carbohydrates in Urine and Blood (1313—1323) .....   | 102—103 |
| Free Carbohydrates in Various Animal Materials (1324—1337) ..   | 103     |
| Free and Bound Carbohydrates in Milk and Mammary Glands (1338—1348) .....   | 103—104 |
| Analysis of Carbohydrates Obtained by the Hydrolysis of Animal Material (1349—1385) .....   | 104—106 |
| Analysis of Carbohydrates in Products and Intermediates of the Food Industry (1387—1411) .....  | 106—107 |
| Enzymatic Reactions and Carbohydrate Metabolism .....   | 107     |
| Hydrolysis and Synthesis of Oligo- and Polysaccharides, Transglycosidation (1412—1509) .....  | 107—112 |
| Enzymatic Conversions of Monosaccharides Connected with Oxidation, Reduction, Isomerisation etc. (1510—1535) .....                              | 112—113 |
| Reactions of Carbohydrates with Nitrogen Compounds (1536—1545)  | 113—114 |
| Investigation of Non-biological Reactions of Carbohydrates (Hydrolysis, Isomerisation, Degradation, Application to Synthesis) (1546—1603) ..... | 114—117 |
| Sugar Alcohols (1603a—1636) .....   | 117—118 |

|  |         |
|--|---------|
| Acids and Lactones of the Carbohydrate Series (1637—1654) .....                        | 119     |
| Uronic Acids (1655—1688) .....   | 120—121 |
| Keto Acids (1689—1697) .....   | 121—122 |
| Deoxy Sugars (1698—1719) .....   | 122—123 |
| Sugar Anhydrides (1720—1726) .....   | 123     |
| Methylated Sugars (Ethers and Methyl Glycosides) (1727—1747) ....                      | 123—125 |
| Amino Sugars .....   | 125     |
| Techniques (1748—1757) .....   | 125     |
| Application to Animal Material (1758—1784) .....                                       | 125—127 |
| Amino Sugars in Microbiological Material. Metabolism of Amino Sugars (1785—1824) ..... | 127—129 |
| Other Applications (1825—1866) .....   | 129—131 |
| Sulfur Containing Carbohydrates (1867—1889) .....                                      | 131—132 |
| Other Sugar Derivatives (1890—1911) .....  | 132—133 |
| Chromatography of Polysaccharides (1912—1922) .....                                    | 133     |
| Structure Investigations of Oligo- and Polysaccharides .....                           | 134     |
| Structure of Polysaccharides from Microorganisms (1923—1939) ..                        | 134—135 |
| Structure of Vegetable Polysaccharides (1940—2035) .....                               | 135—139 |
| Structure of Polysaccharides in Other Materials (2036—2054) ....                       | 139—140 |
| Organic Acids .....  | 141     |
| Reviews (2056—2059) .....  | 141     |
| Lower Fatty Acids .....  | 141     |
| Techniques (2060—2076) .....   | 141—142 |
| Analysis in the Form of Derivatives (2077—2085) .....                                  | 142—143 |
| Applications .....   | 143     |
| Animal Material (2086—2096) .....  | 143     |
| Microbiological Material (2097—2108) .....   | 144     |
| Various Foodstuffs and Products (2109—2115) .....                                      | 144—145 |
| Other Applications (2116—2134) .....   | 145     |
| Higher Fatty Acids .....   | 146     |
| Techniques (2135—2184) .....   | 146—148 |
| Analysis in the Form of Derivatives (2185—2193) .....                                  | 148—149 |
| Applications (2194—2222) .....   | 149—150 |
| Analysis of Oils (2223—2231) .....   | 150—151 |
| Aliphatic Hydroxy Acids, Di- and Tricarboxylic Acids .....                             | 151     |
| Techniques .....   | 151     |
| Preparation of Sample, Solvent Systems. General Papers on Techniques (2232—2253) ..... | 151—152 |
| Detection and Estimation (2254—2260) .....   | 152—153 |
| Applications .....   | 153     |
| Plant Tissues and Products (2261—2285) .....   | 153—154 |
| Animal Material (2286—2309) .....  | 154—155 |
| Investigation of Metabolism of Non-volatile Organic Acids (2310—2368) .....            | 155—158 |
| Various Foodstuffs and Products (2369—2380) .....                                      | 158—159 |
| Other Applications (2381—2420) .....   | 159—161 |
| Keto Acids .....   | 161     |
| Techniques (2421—2434) .....   | 161—162 |
| Applications .....   | 162     |
| Plant Tissues and Products (2435—2437) .....   | 162     |
| Animal Material (2438—2461) .....  | 162—163 |

|   |         |
|---|---------|
| Microbiological Material. Metabolism of Keto Acids (2462—2493)              | 163—165 |
| Non-biological Material (2494—2506)   | 165—166 |
| Cyclic Acids  | 166     |
| Techniques (2507—2542)  | 166—168 |
| Applications  | 168     |
| Plant Material (2543—2585)  | 168—170 |
| Animal Material (2586—2635)   | 170—172 |
| Microbiological Material and Their Metabolism (2636—2669)                   | 173—174 |
| Various Non-biological Applications (2670—2701)                             | 174—176 |
| Food and Food Preservatives (2702—2712)                                     | 176     |
| Lichen Acids (2713—2716)  | 176—177 |
| Gibberellic Acid Derivatives (2717—2723)                                    | 177     |
| Lipids (2724—2743)  | 177—178 |
| Organic Peroxides (2744—2753)   | 179     |
| Steroids  | 180     |
| Reviews (2754—2757)   | 180     |
| General Methods of Chromatography of Steroids (2758—2790)                   | 180—182 |
| Oestrogens (2791—2839)  | 182—184 |
| Bile Acids (and Other Steroid Acids) (2840—2867)                            | 184—186 |
| Androstane Derivatives  | 186     |
| Techniques (2868—2877)  | 186     |
| Non-biological Applications (2878—2881)                                     | 187     |
| Microbiological Applications (2882—2888)                                    | 187     |
| Animal Material (2889—2922)   | 187—189 |
| Pregnane Derivatives  | 189     |
| Techniques (2923—2970)  | 189—192 |
| Applications in Synthetic Organic Chemistry (2971—3001)                     | 192—193 |
| Microbiological Transformations of Pregnane Derivatives (3002—3010)         | 194     |
| Animal Material (3011—3070)   | 194—197 |
| Urine (3071—3103)   | 197—199 |
| Sterols (3104—3137)   | 199—201 |
| Steroid Glycosides and Related Substances                                   | 202     |
| Cardiac Glycosides and Their Genins (3138—3251)                             | 202—207 |
| Saponins and Sapogenins (3252—3264)   | 207—208 |
| Toad Venoms of Steroid Nature (3265—3276)                                   | 208—209 |
| Terpene Derivatives   | 210     |
| Various Terpene Derivatives (3277—3310)                                     | 210—212 |
| Azulenes and Proazulenes (3311—3315)  | 212     |
| Terpene Acids (3316—3324)   | 212     |
| Amines  | 213     |
| Aliphatic Amines  | 213     |
| Alkylamines and Related Substances (3325—3364)                              | 213—215 |
| Amino Alcohols. Choline, Betaine and Other Quaternary Amines.               |         |
| Amides of Aliphatic Acids (3365—3404)                                       | 215—217 |
| Urea and Its Derivatives (3405—3409)  | 217     |
| Guanidine Derivatives (3410—3440)   | 217—219 |
| Hydrazine, Hydrazides and Hydrazones (3441—3449)                            | 219     |
| Aromatic and Other Cyclic Amines (3450—3519)                                | 219—223 |
| Anthranilic Acid and Its Derivatives; Metabolites of Tryptophan (3520—3543) | 223—224 |

|  |         |
|--|---------|
| Local Anaesthetics (3544—3552) .....   | 224—225 |
| Sympathomimetic Amines and Related Compounds (3553—3627) .....   | 225—229 |
| Other Aralkylamines (3628—3642) .....  | 229     |
| Nitro Compounds (3643—3668) .....  | 230—231 |
| Amino Acids .....  | 232     |
| Reviews (3669—3671) .....  | 232     |
| Techniques .....   | 232     |
| Sample Preparation (3672—3680a) .....  | 232—233 |
| Detection (3681—3708) .....  | 233—234 |
| Development of Chromatograms (3710—3763) .....   | 234—237 |
| Determination .....  | 237     |
| General Problems (3764—3768) .....   | 237—238 |
| Determination Directly on Paper (3769—3781) .....  | 238     |
| The Dye Formed on Paper is Eluted and Estimated by Photo-...<br>metry (3782—3797) .....                                    | 238—239 |
| Estimation after Elution from Paper (3798—3806) .....  | 239—240 |
| Estimation of Amino Acids in the Form of Dinitrophenyl Amino<br>Acids or Phenylthiohydantoin Derivatives (3807—3811) ..... | 240     |
| Various Amino Acid Derivatives .....   | 241     |
| Metal Complexes with Amino Acids (3812—3814) .....   | 241     |
| Carboxyl Group Derivatives of Amino Acids (3815—3827) .....  | 241     |
| Amino Group Derivatives of Amino Acids (3828—3857) .....   | 241—243 |
| Mercapturic Acids and Other S-Derivatives of Cysteine (3857a—3869).  | 243—244 |
| Other Amino Acid Derivatives (3870—3879) .....   | 244     |
| Applications .....   | 244     |
| Amino Acids in Microbiological Material .....  | 244     |
| Free Amino Acids (3880—3911) .....   | 244—246 |
| Bound Amino Acids (3912—3975) .....  | 246—249 |
| Amino Acids Liberated by Hydrolysis of Antibiotics (3976—3992)   | 249—250 |
| Amino Acids in Plant Material .....  | 250     |
| Free Amino Acids (3993—4076) .....   | 250—254 |
| Bound Amino Acids (4077—4120) .....  | 254—256 |
| Amino Acids in Products of Plant Origin (4121—4142) .....  | 256—258 |
| Free Amino Acids in Animal Material .....  | 258     |
| Blood, Plasma, Serum, Blood Cells (4143—4166) .....  | 258—259 |
| Urine (4167—4227) .....  | 259     |
| Techniques and Content in Normal Individuals (4167—4187)...  | 259—260 |
| Amino Aciduria in Pathological Cases (4188—4213).....  | 260—261 |
| Amino Aciduria under Experimental Conditions (4214—4227) ..  | 261—262 |
| Exudates (4228—4230) .....   | 262     |
| Cerebrospinal Fluid and Aqueous Humour (4231—4241) .....   | 262—263 |
| Saliva and Teeth (4242—4246) .....   | 263     |
| Gastric Juice, Bile, and Faeces (4247—4255) .....  | 263—264 |
| Skin and Hair (4256—4257) .....  | 264     |
| Semen (4258—4260) .....  | 264     |
| Milk and Milk Products (4261—4269) .....   | 264—265 |
| Organs of Vertebrate Animals (4270—4305) .....   | 265—267 |
| Amino Acids of Arthropoda (4306—4323) .....  | 267—268 |
| Animals Other than Vertebrates and Arthropoda (4324—4330)...   | 268     |
| Bound Amino Acids from Animal Material .....   | 268     |
| Protamines, Histones, and Nucleopeptides (4331—4338) .....   | 268—269 |

|   |         |
|---|---------|
| Keratin and Connective Tissue (4339—4361) .....   | 269—270 |
| Blood Plasma and Cells Haemoproteins (4362—4374).....   | 270     |
| Mucoproteins (4375—4379) .....  | 271     |
| Enzymes, Bile, and Animal Venoms (4380—4387) .....  | 271     |
| Hormones (4388—4393) .....  | 271—272 |
| Various Tissues (4394—4403) .....   | 272     |
| Nervous and Eye Tissues (4404—4407) .....   | 272—273 |
| Milk and Milk Products (4408—4413) .....  | 273     |
| Eggs, Placenta, and Embryonic Tissues (4414—4419) .....   | 273     |
| Insect Material (4420—4426) .....   | 274     |
| Enzymatic Reactions of Amino Acids .....  | 274     |
| Metabolism of Microorganisms (4427—4475) .....  | 274—276 |
| Metabolism of Plants (4476—4498) .....  | 276—277 |
| Metabolism of Animals (4499—4564) .....   | 278—281 |
| Applications on Non-biological Material (4565—4660) .....   | 281—285 |
| Halogenated Amino Acids .....   | 286     |
| Amino Acids Containing Chlorine and Fluorine (4661—4675) .....  | 286     |
| Iodinated Amino Acids: Techniques and Non-biological Applications<br>(4676—4707) .....                                      | 286—288 |
| Iodinated Amino Acids in Microbiological and Plant Material<br>(4708—4710) .....  | 288     |
| Iodinated Amino Acids and Their Metabolites in Animal Material<br>(4711—4772) .....   | 288—291 |
| Peptides .....  | 292     |
| Detection and Determination (4773—4775) .....   | 292     |
| Solvent Systems for Peptides (4776—4791) .....  | 292—293 |
| Peptide Derivatives (4792—4807) .....   | 293—294 |
| Applications .....  | 294     |
| Chromatography of Synthetic Peptides and Investigation of Non-<br>biological Reactions (4808—4876) .....                    | 294—298 |
| Peptides in Microorganisms (4877—4890) .....  | 298     |
| Plant Peptides (4891—4899) .....  | 299     |
| Animal Peptides (4900—4938) .....   | 299—301 |
| Investigation of Enzymatic Transformations of the Peptides and<br>Their Metabolism (4939—4957) .....                        | 301—302 |
| Studies on the Chemical Structure of Peptides and Proteins .....  | 303     |
| Reviews; Techniques of Cleavage and Preliminary Fractionation (4958—<br>4960) .....   | 303     |
| Methods for Determination of the Amino End of the Peptide Chain ...   | 303     |
| Determination of Terminal Groups by Means of Dinitrophenylation<br>(4961—4972) .....  | 303—304 |
| Determination of Terminal Amino Groups Based on the Formation of<br>Phenylthiohydantoins (PTH) (4973—4978) .....            | 304     |
| Other Methods (4979—4984) .....   | 304—305 |
| Methods for Determination of Terminal Carboxyl Groups .....   | 305     |
| Carboxypeptidase Method (4985—4987) .....   | 305     |
| Reduction of the Carboxyl Group and Methods for the Determinat-<br>ion of the CONH <sub>2</sub> End-Group (4988—4991) ..... | 305     |
| Hydrazinolysis (4992—4998) .....  | 305—306 |
| Other Methods (4999—5000) .....   | 306     |
| Applications to Structural Studies of Proteins and Peptides .....   | 306     |

|  |         |
|--|---------|
| Microbiological Material (5001—5029) .....                                       | 306—308 |
| Plant Proteins and Peptides (5030—5046) .....                                    | 308—309 |
| Animal Proteins and Peptides .....   | 309     |
| Protamines (5047—5053) .....   | 309     |
| Keratin, Silk, Collagen etc. (5054—5062) .....                                   | 309—310 |
| Blood Plasma Proteins and Peptides (5063—5076) .....                             | 310     |
| Haemoproteins (5077—5104) .....  | 310—312 |
| Digestive Enzymes and Their Proenzymes (5105—5132) .....                         | 312—313 |
| Milk Proteins (5133—5141) .....  | 313—314 |
| Lysozyme and Ovalbumin (5142—5151) .....   | 314     |
| Insulin and Glucagon (5152—5161) .....   | 314—315 |
| Pituitary Hormones (5162—5178) .....   | 315—316 |
| Other Animal Peptides and Proteins (5179—5194) .....                             | 316—317 |
| Synthetic Products (5195—5199) .....   | 317     |
| Proteins .....   | 318     |
| Proteins of Blood Plasma (5200—5205) .....                                       | 318     |
| Antigens and Antibodies (5206—5211) .....  | 318     |
| Haemoproteins (5212—5217) .....  | 319     |
| Insulin (5218—5223) .....  | 319     |
| Enzymes (5224—5232) .....  | 319—320 |
| Other Protein Groups (5233—5243) .....   | 320     |
| Purines, Pyrimidines, Nitrogenous Components of Nucleic Acids .....              | 321     |
| Reviews (5244) .....   | 321     |
| Techniques in the Field of Purines, Pyrimidines, Nucleic Acids (5245—5262) ..... | 321—322 |
| Applications .....   | 322     |
| Non-biological Applications (5263—5305) .....                                    | 322—324 |
| Microbiological Material (5306—5333) .....                                       | 324—325 |
| Plant Material (5334—5336) .....   | 326     |
| Animal Material (5337—5364) .....  | 326—327 |
| Investigation of Nucleic Acids .....   | 327     |
| Analysis of Ribonucleic Acids (5365—5422) .....                                  | 327—330 |
| Analysis of Deoxyribonucleic Acids (5423—5453) .....                             | 330—331 |
| Investigation of the Nucleotide Sequence in Nucleic Acids (5454—5466) .....      | 331—332 |
| Nucleotides .....  | 332     |
| Techniques (5467—5488) .....   | 332—333 |
| Non-biological Applications (5489—5545) .....                                    | 333—336 |
| Nucleotides from Microorganisms (5546—5572) .....                                | 336—338 |
| Nucleotides from Plants (5573—5586) .....  | 338     |
| Nucleotides of Animal Origin (5587—5637) .....                                   | 339—341 |
| Enzymatic Reactions and Metabolism (5638—5730) .....                             | 341—346 |
| Antimetabolites and Other Analogues of the Purine and Pyrimidine Series .....    | 346     |
| Techniques and Non-biological Applications (5731—5800) .....                     | 346—349 |
| Enzymatic Transformations and Metabolism (5801—5834) .....                       | 350—351 |
| Uric Acid and Its Derivatives (5835—5847) .....                                  | 351—352 |
| Barbituric Acid Derivatives (5848—5885) .....                                    | 352—354 |
| Alkaloids .....  | 355     |
| Reviews (5886—5889) .....  | 355     |
| General Techniques for Alkaloids (5890—5910) .....                               | 355—356 |
| Individual Groups of Alkaloids .....   | 356     |



|   |         |
|---|---------|
| Colechicum Alkaloids (5911—5914) .....  | 356     |
| Tobacco Alkaloids (5915—5933) .....   | 357     |
| Lobelia Alkaloids (5934—5943) .....   | 357—358 |
| Tropine Alkaloids (5944—5971) .....   | 358—359 |
| Cinchona Alkaloids (5972—5973) .....  | 359—360 |
| Opium Alkaloids (5974—6014) .....   | 360—362 |
| Curare Alkaloids (6015—6027) .....  | 362     |
| Quinolizidine Alkaloids (6028—6048) .....   | 362—363 |
| Alkaloids of Papaveraceae (6049—6065a) .....  | 364     |
| Harman Alkaloids (6066—6070) .....  | 365     |
| Carboline Alkaloids (6071—6096) .....   | 365—366 |
| Ergot Alkaloids (6097—6137) .....   | 366—368 |
| Xanthine Derivatives (6138—6145) .....  | 368     |
| Veratrum Alkaloids (6146—6162) .....  | 368—369 |
| Steroid Alkaloids (6163—6182) .....   | 369—370 |
| Other Alkaloid Groups (6183—6259) .....   | 370—374 |
| Separation of Alkaloids of Different Groups (6260—6269) .....   | 374—375 |
| Systematic Analysis of Alkaloids (6270—6271) .....  | 375     |
| Other Compounds with Heterocyclic Nitrogen .....  | 376     |
| Pyrroles .....  | 376     |
| Porphyrins (6272—6293) .....  | 376—377 |
| Haemes and Haemins (6294—6301) .....  | 377—378 |
| Bile Pigments (6302—6315) .....   | 378     |
| Other Pyrrole Derivatives (6316—6326) .....   | 378—379 |
| Pyrazole Derivatives (6327—6329) .....  | 379     |
| Imidazoles (6330—6343) .....  | 379—380 |
| Histamine and Its Metabolites (6344—6359) .....   | 380—381 |
| Urocanic Acid and Its Metabolites (6360—6370) .....   | 381     |
| Ergothioneine (6371—6375) .....   | 381—382 |
| Indoles .....   | 382     |
| Techniques (6376—6390) .....  | 382—383 |
| Serotonin and Its Metabolites (6391—6415) .....   | 383—384 |
| Indoles in Plants (6416—6447) .....   | 384—386 |
| Indoles in Animals (6448—6469) .....  | 386—387 |
| Enzymatic Reactions and Metabolism of Indole Compounds and<br>Their Content in Microorganisms (6470—6484) ..... | 387—388 |
| Non-biological Applications (6485—6499) .....   | 388     |
| Pyridine Derivatives (6500—6515) .....  | 388—389 |
| Nicotinic and Isonicotinic Acids and Their Derivatives (6516—<br>6545) .....                                    | 389—391 |
| Other Pyridine and Piperidine Carboxylic Acids (6546—6562) .....  | 391—392 |
| Quinoline Derivatives (6563—6576) .....   | 392     |
| Phenoxazines (6577—6582) .....  | 393     |
| Pyrazines (6583—6585) .....   | 393     |
| Triazoles and Triazines (6586—6597) .....   | 393—394 |
| Other Substances with Heterocyclic Nitrogen (6598—6621) .....   | 394—395 |
| Organic Sulfur Compounds .....  | 396     |
| Reviews. General Techniques (6622—6628) .....   | 396     |
| Thiols, Sulfides, Sulfonium Salts and Related Compounds (6629—<br>6657) .....                                   | 396—398 |

|  |         |
|--|---------|
| Alkyl Sulfonates, Esters of Sulfuric and Thiophosphoric Acids with Aliphatic Compounds (6658—6663) ..... | 398     |
| Derivatives of Thiourea and Thiocarbamic Acid (6664—6681) .....  | 398—399 |
| Isothiocyanates. Mustard-oil Glycosides (6682—6695) .....  | 399—400 |
| Cyclic Sulfonic Acids and Sulfuric Acid Esters (6696—6731) .....   | 400—402 |
| Sulfanilamides. Saccharin (6732—6766) .....  | 402—404 |
| Compounds with Heterocyclic Sulfur (6767—6794) .....   | 404—406 |
| Organic Phosphorus Compounds .....   | 407     |
| Phosphoric Acid Esters and Related Compounds .....   | 407     |
| Techniques (6795—6819) .....   | 407—408 |
| Applications .....   | 408     |
| Plant Material (6820—6833) .....   | 409     |
| Animal Material (6834—6855) .....  | 409—411 |
| Microorganisms (6856—6861) .....   | 411     |
| Enzymatic Reactions and Metabolism of Organophosphates (6862—6888) .....                                 | 411—412 |
| Non-biological Applications (6889—6921) .....  | 412—414 |
| Phospholipids .....  | 414     |
| Separation Technique of Phospholipids (6922—6945) .....  | 414—415 |
| Phospholipids in Animal Material (6946—6988) .....   | 415—417 |
| Other Applications (6989—6998) .....   | 418     |
| Components of Phospholipids (6999—7068) .....  | 418—422 |
| Metal-Organic Compounds (7069—7081) .....  | 423     |
| Vitamins .....   | 424     |
| Vitamins A (7082—7090) .....   | 424     |
| Vitamins D (7090a—7094) .....  | 424—425 |
| Vitamins E (7096—7111) .....   | 425     |
| Vitamins K (7112—7117) .....   | 426     |
| Ubiquinones (Coenzymes Q) (7118—7129) .....  | 426—427 |
| Vitamin B Group .....  | 427     |
| Thiamine (7130—7163) .....   | 427—428 |
| Thioctic Acid (7164—7168) .....  | 428—429 |
| Riboflavin and Other Flavins (7169—7223) .....   | 429—432 |
| Nicotinic Acid and Nicotinamide. Coenzyme I and II (see 6516—6545) .....                                 | 432     |
| Pyridoxin Group (7224—7241) .....  | 432—433 |
| Biotin and Its Derivatives (7242) .....  | 433     |
| Pantothenic Acid and Coenzyme A (7243—7254) .....  | 433     |
| Pteridine Derivatives (7255—7346) .....  | 434—438 |
| Cobalamin Group (7347—7395) .....  | 438—440 |
| Ascorbic Acid (7396—7423) .....  | 440—442 |
| Vitamin Mixtures. Various Growth Factors (7424—7428) .....   | 442     |
| Antibiotics .....  | 443     |
| Penicillin and Its Degradation Products (7429—7436) .....  | 443     |
| Streptomycin Group (7437—7439) .....   | 443     |
| Neomycin, Kanamycin (7440—7444) .....  | 444     |
| Chloramphenicol (7445) .....   | 444     |
| Tetracyclines (7446—7455) .....  | 444—445 |
| Macrolides, Erythromycin (7456—7458) .....   | 445     |
| Oxamycin (7459—7460) .....   | 445     |
| Antibiotics of Peptidic Nature (7461—7472) .....   | 445—446 |

|  |         |
|--|---------|
| Actinomycins and Some Other Antibiotics from Actinomycetes (7473—7486) .....                                 | 446—447 |
| Reviews, Mixtures of Antibiotics, General Techniques and Theory (7487—7496) .....                            | 447     |
| Various Antibiotics of Microbial Origin (7497—7522) .....  | 447—449 |
| Antibiotics of Vegetable (and Animal) Origin (7523—7529) .....   | 449     |
| <b>Insecticides</b> .....  | 450     |
| Pyrethrins (7530—7531) .....   | 450     |
| Chlorinated Insecticides (7532—7541) .....   | 450—451 |
| Phosphorus Compounds with Insecticide Activity (7542—7568) .....   | 451—452 |
| <b>Pigments</b> .....  | 453     |
| <b>Synthetic Dyes</b> .....  | 453     |
| Techniques (7569—7602) .....   | 453—454 |
| Applications (7603—7638) .....   | 455—457 |
| Food Industry and Pharmacy (7639—7682) .....   | 457—459 |
| Cosmetics (7683—7686) .....  | 459     |
| <b>Natural Pigments</b> .....  | 459     |
| Chloroplast Pigments (7687—7712) .....   | 459—461 |
| Unidentified Natural Pigments and Fluorescent Substances (7713—7734) .....                                   | 461—462 |
| <b>Plastics</b> .....  | 463     |
| Phenol-formaldehyde Resins and Intermediates (7735—7740) .....   | 463     |
| Resins and Intermediates Based on Urea, Thiourea and Melamin(7741) .....                                     | 463     |
| Polyamides and Their Intermediates (7742—7750) .....   | 464     |
| Other Plastics and Their Intermediates (7751—7762) .....   | 464—465 |
| <b>Pharmaceutical Applications</b> .....   | 466     |
| Mixtures of Drugs (7763—7790) .....  | 466—467 |
| Extracts and Tinctures (7791—7811) .....   | 467—468 |
| <b>Inorganic Compounds</b> .....   | 469     |
| <b>Reviews (7812—7816)</b> .....   | 469     |
| <b>Analysis of Cations</b> .....   | 469     |
| <b>Techniques</b> .....  | 469     |
| Sample Preparation and Development (Solvent Systems, Theory, Mechanism, Complex Formation) (7817—7902) ..... | 469—474 |
| Detection (7903—7909) .....  | 474     |
| Determination (7910—7931) .....  | 474—475 |
| <b>Individual Groups of Cations</b> .....  | 476     |
| Analytical Groups I and IIa (7932—7944) .....  | 476     |
| Analytical Group IIb (7945—7957) .....   | 476—477 |
| Platinum Metals and Gold (7958—7964) .....   | 477     |
| Analytical Group III (7965—7991) .....   | 478—479 |
| Uranium, Protactinium, and Actinides (7992—8004) .....   | 479—480 |
| Rare Earths (8005—8007) .....  | 480     |
| Analytical Group IV (8008—8020) .....  | 480—481 |
| Analytical Group V (8021—8027) .....   | 481     |
| Mixtures of Cations of Different Groups (8028—8039) .....  | 481—482 |
| Systematic Analysis. Application to a Large Number of Cations Present Simultaneously (8040—8043) .....       | 482     |
| <b>Analysis of Anions (8044—8068)</b> .....  | 482—484 |
| <b>Inorganic Sulfur-containing Anions (8069—8083)</b> .....  | 484     |
| <b>Halides (8084—8089)</b> .....   | 485     |

|  |         |
|--|---------|
| Inorganic Phosphorus Compounds (8090—8136) .....   | 485—487 |
| Radioactive Substances .....   | 488     |
| Reviews (8137—8139) .....  | 488     |
| Radiometric Methods (8140—8155) .....  | 488—489 |
| Activation Analysis (8156—8161) .....  | 489     |
| Use of Radioactive Substances or Reagents for Chromatographic Analysis, Detection or Determination of Non-radioactive Substances (8162—8168) ..... | 489—490 |
| Tritium $^3\text{H}$ (8169—8180) .....   | 490—491 |
| Carbon $^{14}\text{C}$ .....   | 491     |
| Techniques and Various Non-biological Applications (8181—8187)..   | 491     |
| Microorganisms (8188—8195) .....   | 491—492 |
| Plants (8196—8224) .....   | 492—493 |
| Animals (8225—8245) .....  | 493—495 |
| Phosphorus $^{32}\text{P}$ (8246—8255) .....   | 495     |
| Sulfur $^{35}\text{S}$ .....   | 495     |
| Microorganisms and Plants (8256—8259) .....  | 495—496 |
| Animals (8260—8272) .....  | 496     |
| Non-biological Applications (8273—8275) .....  | 496—497 |
| Iodine $^{131}\text{I}$ (8276—8282) .....  | 497     |
| Other Radioactive Elements (8283—8292) .....   | 497—498 |
| AUTHOR INDEX .....   | 499—582 |
| LIST OF SUBSTANCES CHROMATOGRAPHED .....   | 583—706 |