

## CONTENTS

PREFACE . . . . .	7
-------------------	---

## PART I, GENERAL

SOME NOTES ON THE HISTORY OF PAPER CHROMATOGRAPHY ( <i>I. M. Hais</i> ) . . . . .	17
PRINCIPLES AND THEORY OF PAPER CHROMATOGRAPHY ( <i>J. Dvořák, I. M. Hais and A. Tockstein</i> ) . . . . .	27
Introduction . . . . .	27
Mathematical Treatment of the Chromatographic Process . . . . .	35
Relationship Between Structure and Chromatographic Behaviour . . . . .	53
PREPARATION AND APPLICATION OF SAMPLE ( <i>I. M. Hais</i> ) . . . . .	86
Preparation of Sample . . . . .	86
Application of Sample . . . . .	90
CHROMATOGRAPHY PAPERS ( <i>K. Macek and I. M. Hais</i> ) . . . . .	96
Cellulose Papers . . . . .	96
Modified Papers . . . . .	106
Papers from Materials Other than Cellulose . . . . .	112
DEVELOPMENT ( <i>K. Macek and I. M. Hais</i> ) . . . . .	115
The Selection of Solvent Systems ( <i>K. Macek and Ž. Procházka</i> ) . . . . .	115
Development Techniques . . . . .	125
Position and Shape of Spots . . . . .	147
Paper Chromatography Laboratories and Their Equipment . . . . .	164
DETECTION AND DETERMINATION OF SEPARATED SUBSTANCES ( <i>I. M. Hais</i> ) . . . . .	170
Detection Methods . . . . .	170
Elution from Paper . . . . .	185
Quantitative Analysis ( <i>I. M. Hais and P. Zuman</i> ) . . . . .	188
RADIOACTIVE SUBSTANCES IN PAPER CHROMATOGRAPHY ( <i>I. M. Hais</i> ) . . . . .	207
Techniques . . . . .	208
Applications in Analytical Chemistry . . . . .	219
PREPARATIVE PAPER CHROMATOGRAPHY ( <i>Ž. Procházka</i> ) . . . . .	225

## PART II, SPECIAL

HYDROCARBONS ( <i>Č. Michalec</i> ) . . . . .	235
ALCOHOLS ( <i>K. Macek</i> ) . . . . .	238
Aliphatic Alcohols . . . . .	238
Cyclic Alcohols . . . . .	243
PHENOLS ( <i>Ž. Procházka</i> ) . . . . .	245

OXYGEN CONTAINING HETEROCYCLIC COMPOUNDS (P. Jiráček and Ž. Procházka)	254
<b>Flavonoid</b> Compounds	254
<b>Coumarins</b>	271
Other Oxygen Containing Heterocyclic Compounds	275
<b>OXO</b> COMPOUNDS (K. Macek)	279
Aliphatic Aldehydes and Ketones	279
Cyclic Aldehydes and Ketones	283
Volatile Aldehydes and Ketones	284
Phenolic Aldehydes and Ketones; Lignins (Ž. Procházka)	284
<b>SUGARS</b> (K. Macek)	289
Relation Between the Structure and $R_F$ value	289
Techniques	294
simple Sugars	297
Sugar Derivatives and Substituted Sugars	310
Sugar Alcohols	310
Sugar Acids and <b>Lactones</b>	311
Deoxy Sugars	315
Methyl Glycosides and Ethers	317
Amino Sugars	319
Other Sugar Derivatives	321
<b>Polysaccharides</b>	322
Paper Chromatography of Polysaccharides	322
Determination of the Structure of Polysaccharides	323
<b>ORGANIC ACIDS</b> (K. Macek)	331
The Relationship Between Structure and Chromatographic Behaviour	331
Techniques	333
Lower Fatty Acids	334
Higher Aliphatic Acids (Ā Michalec)	338
Glycerides (Ā Michalec)	343
Hydroxy Acids, Dicarboxylic and Tricarboxylic Acids	344
Keto Acids	350
Cyclic Acids (Ž. Procházka)	354
<b>ORGANIC PEROXIDES AND PEROXY ACIDS</b> (K. Macek)	361
<b>STEROIDS</b> (O. Siblíková)	363
Relation Between Structure and $R_F$ value	363
Techniques	367
Individual Steroid Groups	381
Steroid <b>Amines</b>	381
<b>Bile and Other Steroid Acids</b> (Ā Michalec)	381
<b>Oestrogens</b>	384
<b>Androstane Derivatives</b>	385
<b>Pregnane Derivatives</b>	387
Sterols and Calciferols (Ā Michalec)	392
<b>STEROID GLYCOSIDES AND THEIR AGLYCONES</b> (Z. Jung)	399
Relation Between Structure and the $R_F$ Value	399
Techniques	402
Steroid <b>Saponins</b>	406
<b>TERPENES</b> (Ž. Procházka)	409
<b>ALIPHATIC AND AROMATIC AMINES</b> (J. Gasparič)	414
Aliphatic Amino Compounds	418
Aromatic <b>Amines</b>	423
<b>Arylalkylamines</b>	428
<b>NITRO COMPOUNDS</b> (I. Franc)	432

AMINO ACIDS ( <i>I. M. Hais</i> ) . . . . .	437
Relationship Between Structure and Chromatographic Behaviour . . . . .	437
Techniques . . . . .	439
Preparation of Sample . . . . .	439
Application of Samples. Paper . . . . .	441
Detection . . . . .	441
Solvent Systems . . . . .	451
Quantitative Analysis . . . . .	471
Practical Applications . . . . .	477
Halogenated Amino Acids . . . . .	485
PEPTIDES AND THE DETERMINATION OF THE CHEMICAL STRUCTURE OF PROTEINS ( <i>B. Meloun</i> ) . . . . .	495
Peptides . . . . .	495
Chemical Research into the Structure of Proteins and Peptides . . . . .	501
PROTEINS ( <i>K. Macek</i> ) . . . . .	534
Enzymes . . . . .	536
Other Proteins . . . . .	540
PURINE AND PYRIMIDINE DERIVATIVES ( <i>Z. Pádr</i> ) . . . . .	545
Components of Nucleic Acids . . . . .	545
Purine and Pyrimidine Bases of Nucleic Acids . . . . .	545
Nucleosides and Nucleotides . . . . .	549
Oligonucleotides . . . . .	554
Constitution and Structure of Nucleic Acids . . . . .	557
Nucleoside Polyphosphates . . . . .	558
Purine and Pyrimidine Derivatives . . . . .	561
Barbiturates . . . . .	564
Uric acid . . . . .	565
ALKALOIDS ( <i>K. Macek</i> ) . . . . .	570
Techniques . . . . .	572
Alkaloids without Heterocyclic Nitrogen (Ephedrine, Galegine, Colchicine Group) . . . . .	577
Pyridine and Pyrimidine Derivatives (Tobacco Alkaloids, Lobelia Alkaloids, Conium Alkaloids, Sedum Alkaloids) . . . . .	578
Alkaloids with a Condensed Pyrrolidine-Piperidine Ring (Tropine Alkaloids, Cocaine Group) . . . . .	580
Alkaloids with a Quinoline Ring (Cinchona Alkaloids) . . . . .	582
Alkaloids with an Isoquinoline Ring (Opium Alkaloids, Curare Alkaloids, Protoberberine Alkaloids, Benzophenanthridine Alkaloids) . . . . .	582
Alkaloids with a Quinolizidine Ring (Lupin Alkaloids) . . . . .	587
Indole Derivatives (Carboline Alkaloids, Ergot Alkaloids, Strychnos Alkaloids, Other Alkaloids) . . . . .	587
Steroid Alkaloids (Veratrum Alkaloids, Other Alkaloids) . . . . .	593
Systematic Analysis . . . . .	595
OTHER HETEROCYCLIC NITROGEN COMPOUNDS . . . . .	604
Pyridine Derivatives ( <i>K. Macek</i> ) . . . . .	604
Indole Derivatives ( <i>Z. Procházka</i> ) . . . . .	609
Imidazoles ( <i>I. M. Hais</i> ) . . . . .	616
Hydantoins ( <i>K. Macek</i> ) . . . . .	619
Pyrrole Pigments ( <i>A. Komárková</i> ) . . . . .	619
Other Groups of Compounds ( <i>K. Macek</i> ) . . . . .	624
ORGANIC SULPHUR COMPOUNDS ( <i>J. Gasparič</i> ) . . . . .	628
Thiols . . . . .	629
Sulphides, Disulphides and Polysulphides . . . . .	629
Thiourea and its Derivatives . . . . .	630
Isothiocyanates . . . . .	632
Thiuram Sulphides . . . . .	632
Sulphonium Salts . . . . .	632
Alkyl Sulphates . . . . .	633
Sulphonic Acids . . . . .	633

<b>Sulphonamides</b> . . . . .	639
Saccharin . . . . .	642
<b>S-Heterocyclics</b> . . . . .	643
ORGANIC COMPOUNDS CONTAINING PHOSPHORUS . . . . .	645
Phosphoric Esters ( <i>K. Macek</i> ) . . . . .	645
Phospholipids ( <i>Č. Michalec</i> ) . . . . .	651
VITAMINS ( <i>I. M. Hais</i> ) . . . . .	655
Fat Soluble Vitamins . . . . .	655
Vitamin A Group . . . . .	655
<b>Vitamins E</b> . . . . .	656
Vitamin K Group . . . . .	657
<b>Ubiquinones</b> . . . . .	658
B-Complex Vitamins . . . . .	659
Thiamine . . . . .	659
Thioctic Acid . . . . .	663
Riboflavine . . . . .	663
Pyridoxine Group . . . . .	666
Biotin . . . . .	667
Pantothenic Acid and Coenzyme A . . . . .	668
Folic Acid and Pteridine Derivatives ( <i>K. Slavik</i> ) . . . . .	670
Vitamin <b>B<sub>12</sub></b> Group ( <i>V. Rábek</i> ) . . . . .	675
Ascorbic Acid and Related Compounds ( <i>Ž. Procházka</i> ) . . . . .	679
ANTIBIOTICS ( <i>M. Vondráček and I. M. Hais</i> ) . . . . .	686
Penicillins . . . . .	687
Streptomycin Group . . . . .	689
Tetracycline Antibiotics . . . . .	692
<b>Peptide</b> Antibiotics . . . . .	692
Sideromycins . . . . .	694
<b>Macrolide</b> Antibiotics . . . . .	694
Other Antibiotics . . . . .	694
Systematic <b>Analysis</b> of New Antibiotics . . . . .	695
PESTICIDES ( <i>V. Bátora</i> ) . . . . .	700
Insecticides . . . . .	700
Herbicides . . . . .	708
Fungicides . . . . .	710
PIGMENTS . . . . .	712
Synthetic Dyes ( <i>J. Gasparič and J. Franc</i> ) . . . . .	712
Chloroplast Pigments ( <i>Z. Šesták</i> ) . . . . .	721
PLASTICS AND THEIR INTERMEDIATES ( <i>V. Vorobjov</i> ) . . . . .	727
Phenol-Formaldehyde Resins . . . . .	727
Resins Based on Urea, Thiourea and Melamine . . . . .	728
Polyamides . . . . .	729
Polyester and Alkyd <b>Resins</b> . . . . .	730
Macromolecular Substances . . . . .	730
INORGANIC COMPOUNDS ( <i>B. Kakáň</i> ) . . . . .	733
Cations . . . . .	737
Anions . . . . .	767

### PART III, PRACTICAL NOTES

DETECTION REAGENTS — D ( <i>K. Macek</i> ) . . . . .	781
PREPARATION OF SAMPLE. IMPREGNATION OF PAPER. SOLVENT SYSTEMS. QUANTITATIVE ANALYSIS — P ( <i>K. Macek</i> ) . . . . .	828
AUTHOR INDEX . . . . .	875
SUBJECT INDEX . . . . .	908