Chromatographic Fingerprint Analysis Of Herbal Medicines Thinlayer And High Performance Liquid Chromatography Of Chinese Drugs

The limited coverage of data analysis and statistics offered in most undergraduate and graduate analytical chemistry courses is usually focused on practical aspects of univariate methods. Drawing in real-world examples, Practical Guide to Chemometrics, Second Edition offers an accessible introduction to application-oriented multivariate meth

Plant Drug Analysis has proven an invaluable and unique aid for all those involved with drug production and analysis, including pharmacists, chemical and pharmaceutical researchers and technicians, drug importers and exporters, governmental chemical control agencies, and health authorities. From the reviews of the German Edition: "The reviewer would like to recommend this excellent book to all chromatographers, as he considers it highly relevant to the solution of numerous problems. Its main purpose is the demonstration of thin-layer chromatograms of the usual commercial drugs as an aid in testing for identity and purity. ... 165 colour plates, each showing 6 chromatograms and all of superb quality photographs ..." (Journal of Chromatography)

This book is aimed at the large number of people who need to use chemometrics but do not wish to understand

complex mathematics, therefore it offers a comprehensive examination of the field of chemometrics without overwhelming the reader with complex mathematics. * Includes five chapters that cover the basic principles of chemometrics analysis. * Provides two chapters on the use of Excel and MATLAB for chemometrics analysis. * Contains 70 worked problems so that readers can gain a practical understanding of the use of chemometrics.

About 1958, the late Professor R. E. ALSTON and Professor B. L. TURNER, both of the Department ofBotany, The University ofTexas at Austin, initiated a general systematic investigation ofthe legurne genus Baptisia. They found that flavonoid patterns, as revealed by two-dimensional paper chromatography, were valid criteria for the recognition of the Baptisia species and for the documentation of their numerous natural hybrids. Later, they showed that the flavonoid chemistry could be used for the analysis of gene flow among populations. At that time no attempt was made to even partially identify the flavonoids which were detected chromatographically. Neverthe1ess, it soon became apparent that the full value of the chemical data for systematic purposes required knowledge of the structures of the flavonoids. In 1962, one of us (T.J.M.) in collaboration with Drs. ALSTON and TURNER beg an the chemical analysis of the more than 60 flavonoids which had been chromatographi cally detected in the 16 Baptisia species. In the intervening years, a number of chemists and botanists, inc1uding Drs. K. BAETCKE, B. BREHM, M. CRANMER, D. HORNE, J. KAGAN, B.

KROSCHEWSKY, J. MCCLURE, H. RÖSLER, and J. WALLACE, participated in the devel opment of techniques and procedures for the rapid identification of known flavonoids and in the structure determination of new flavonoids. In addition, the flavonoid chem istry of many plants other than Baptisia was investigated.
Volume III of this manual provides an overview of the analytical investigation of 23 additional Chinese Herbal Drugs, which are most commonly used in Traditional Chinese Medicine. Together with Volumes I and II this current volume represents the most comprehensive overview to analytical studies of those herbal drugs. The quality proof of the investigation meets the standard of the European Drug Regulatory Authority. The authors refer to the bioactive constituents, pharmacological and biological activities of all single herbal drugs, as well as their therapeutic applications. Analytical methods applied are described in detail.
Thin layer chromatography (TLC) is increasingly used in the fields of plant chemistry, biochemistry, and molecular biology. Advantages such as speed, versatility, and low cost make it one of the leading techniques used for locating and analyzing bioactive components in plants. Thin Layer Chromatography in Phytochemistry is the first source devoted to supplying state-of-the-art information on TLC as it applies to the separation, identification, quantification, and isolation of medicinal plant components. Renowned scientists working with laboratories around the world demonstrate the applicability of TLC to a remarkable diversity of fields including plant genetics, drug discovery, nutraceuticals,

and toxicology. Elucidates the role of plant materials in the pharmaceutical industry... Part I provides a practical review of techniques, relevant materials, and the particular demands for using TLC in phytochemical applications. The text explains how to determine the biological activity of metabolites and assess the effectiveness of herbal medicines and nutritional supplements. Part II concentrates on TLC methods used to analyze specific plant-based metabolite classes such as carbohydrates, proteins, alkaloids, flavonoids, terpenes, etc. Organized by compound type, each chapter discusses key topics such as sample preparation, plate development, zone detection, densitometry, and biodetection. Demonstrates practical methods that can be applied to a wide range of disciplines... From identification to commercial scale production and quality control, Thin Layer Chromatography in Phytochemistry is an essential bench-top companion and reference on using TLC for the study of plant-based bioactive compounds.

This book highlights the medical importance of and increasing global interest in herbal medicines, herbal health products, herbal pharmaceuticals, nutraceuticals, food supplements, herbal cosmetics, etc. It also addresses various issues that are hampering the advancement of Indian herbal medicine around the globe; these include quality concerns and quality control, pharmacovigilance, scientific investigation and validation, IPR and biopiracy, and the challenge that various indigenous systems of medicine are at risk of being lost. The book also explores the role of traditional medicine in

providing new functional leads and modern approaches that can offer elegant strategies for facilitating the drug discovery process. The book also provides in-depth information on various traditional medicinal systems in India and discusses their medical importance. India has a very long history of safely using many herbal drugs. Folk medicine is also a key source of medical knowledge and plays a vital role in maintaining health in rural and remote areas. Despite its importance, this form of medicine largely remains under-investigated. Out of all the traditional medicinal systems used worldwide, Indian traditional medicine holds a unique position, as it has continued to deliver healthcare throughout the Asian subcontinent since ancient times. In addition, traditional medicine has been used to derive advanced techniques and investigate many modern drugs. Given the scope of its coverage, the book offers a valuable resource for scientists and researchers exploring traditional and herbal medicine, as well as graduate students in courses on traditional medicine, herbal medicine and pharmacy.

This book introduces the methodology for collection and identification of herbal materials, extraction and isolation of compounds from herbs, in vitro bioassay, in vivo animal test, toxicology, and clinical trials of herbal research. To fully understand and make the best use of herbal medicines requires the close combination of chemistry, biochemistry, biology, pharmacology, and clinical science. Although there are many books about traditional medicines research, they mostly focus on either chemical or pharmacological study results of certain plants. This book, however, covers the systematic study and analysis of herbal medicines in general – including chemical isolation and identification, bioassay and

mechanism study, pharmacological experiment, and quality control of the raw plant material and end products.

Adulteration refers to the practice of altering food or pharmaceutical content to reduce production costs. Factors affecting this practice include market forces such as easy availability of food adulterants, bargaining power of consumers and large demand and supply gaps which incentivize such practices. Technological advancements in chemical analysis now help us to identify adulterated food and drugs more easily. Adulteration Analysis of Some Foods and Drugs is a sourcebook describing analytical methodologies for the determination of adulterants in different food items (milk, honey, juice) and drugs (dietary supplements, sildenafil and specific plant extracts). Additional chapters give guidelines for analyzing a food or drug sample. This book is suitable for researchers working in the field of analytical chemistry for the determination of adulterants. The concise and organized presentation of the contents also serves to enhance the level of knowledge of students undertaking food and drug safety / quality control training courses.

The issue of food authenticity is not new. For centuries unscrupulous farmers and traders have attempted to 'extend', or othewise alter, their products to maximise revenues. In recent years the subject has reached new prominence and there even have been situations where food authenticity has featured as a newspaper headline in various countries. Food legislation covering the definition, and in some cases composition, of various commodities has been in place in developed countries for many years and paradoxically it is the legislative trend away from emphasis on composition and more on accurate and truthfullabeliing that has been one driving force for the authenticity issue. Another, and many would speculate as the more potent, driving force is the move

towards fewer and larger supermarket chains in many countries. Such trading companies with their images of quality products, buying power and commercial standing, exercise considerable commercial power which has been claimed as a significant source of financial pressure on food prices and food commodity product quality. For whatever reason, recent food authenticity issues have become news and consumers, the media and enforcement authorities are showing more interest than ever before in the subject.

After the successful introduction of acupuncture to the West, recent advances in analytical methods in chemistry, molecular biology and systems biology – especially the development of the “omic” technologies – have again brought Chinese drugs into the focus of research on Traditional Chinese Medicine (TCM). With more than 1000 publications on the chemistry, molecular biology and pharmacology of TCM drugs in international journals over the last 10 years, Chinese drugs are gaining increasingly reputation and impact. These data offer great opportunities for the development of new pharmaceuticals for various clinical applications. International scientists have compiled relevant and trend setting research results in this book. Topics range from the latest methods of quality and safety assurance by chemical and genetic fingerprints to the development of new pharmaceuticals for a future evidence-based therapy e.g. for cancer, cardiovascular, inflammatory or infectious diseases as well as to recent experimental results on multitarget and synergy research for the preparation of multi-extract-pharmaceuticals from TCM.

The present edited book is the presentation of 18 in-depth national and international contributions from eminent professors, scientists and instrumental chemists from educational institutes, research organizations and industries providing their views on their experience, handling,

observation and research outputs on HPTLC, a multi-dimensional instrumentation. The book describes the recent advancements made on TLC which have revolutionized and transformed it into a modern instrumental technique HPTLC. The book addresses different chapters on HPTLC fundamentals: principle, theory, understanding; instrumentation: implementation, optimization, validation, automation and qualitative and quantitative analysis; applications: phytochemical analysis, biomedical analysis, herbal drug quantification, analytical analysis, finger print analysis and potential for hyphenation: HPTLC future to combinatorial approach, HPTLC-MS, HPTLC-FTIR and HPTLC-Scanning Diode Laser. The chapters in the book have been designed in such away that the reader follows each step of the HPTLC in logical order.

Volume V of this manual provides an overview of the analytical investigation of numerous additional Chinese herbal drugs that are commonly used in Traditional Chinese Medicine (TCM). It illustrates the detailed chromatographic analysis of the main compounds with colored TLC photographs and HPLC peak profiles, and also discusses the bioactive properties, pharmacological and biological activity as well as the therapeutic applications of all single herbal drugs. Together with Volumes I-IV this volume represents the most comprehensive overview of analytical studies of these drugs listed in the Chinese Pharmacopoeia 2010. All the experimental requirements, including the extraction procedure for the Chinese drugs and the solvent systems used for the development of the TLC and HPLC analytical monographs, were adapted according to the latest findings published in international journals and the high standards of the European Drug Regulatory Authority. Therefore Volume V is also a must-have manual for researchers and pharmaceutical laboratories dedicated to TCM.

Evidence-Based Validation of Herbal Medicines brings together current thinking and practice in the areas of characterization and validation of natural products. This book reviews all aspects of evaluation and development of medicines from plant sources, including their cultivation, collection, phytochemical and phyto-pharmacological evaluation, and therapeutic potential. Emphasis is placed on describing the full range of evidence-based analytical and bio-analytical techniques used to characterize natural products, including –omic technologies, phyto-chemical analysis, hyphenated techniques, and many more. Includes state-of-the-art methods for detecting, isolating, and performing structure elucidation by degradation and spectroscopic techniques Covers biosynthesis, synthesis, and biological activity related to natural products Consolidates information to save time and money in research Increases confidence levels in quality and validity of natural products

This manual, to be published in two volumes, provides a condensed overview of the analytical investigation of 80 Chinese Herbal Drugs which are most frequently in use. Thin layer chromatographic-, high pressure liquid chromatographic- and gas chromatographic-fingerprint analytical techniques allow the detection of all main low-molecular constituents of a plant drug and even single constituents can be visualized. Analytical results thereof are shown in numerous color figures. The quality proof of the investigation meets the standard of the European Drug Regulatory Authority. Furthermore, this volume gives a detailed description of the analytical methods used for several drugs. Bioactive constituents, pharmacological and biological activities of several single herbal drugs as well as their therapeutic applications are discussed.

Phytochemical Profiling of Commercially Important South African Plants comprises a carefully selected group of plant

species that are of interest to researchers and industry partners who would like to investigate the commercialization of plant species. The book presents 25 botanicals selected based on commercial relevance. For each of the species, the following topics are covered: botanical description and distribution, phytochemistry (including chemical structures), HPTLC fingerprint analysis, UPLC analysis, and GC analysis (the latter only in the case of essential oil-bearing species). Using standard methodology, high-level chromatographic fingerprints have been developed for better understanding. Different methods are succinctly summarized allowing for the rapid identification of botanical raw materials and formulated consumer products. This book will be extremely valuable to researchers in the field who wish to rapidly identify the constituents and for those who want to prepare formulations of plant material for commercial applications. This work will also be a valuable resource in the field of pharmacognosy. Comprehensive chemical profiling of each species Fingerprints developed for non-volatile and volatile constituents Methods succinctly summarized to ensure reproducibility

Global dietary recommendations emphasize the consumption of plant-based foods for the prevention and management of chronic diseases. Plants contain many biologically active compounds referred to as phytochemicals or functional ingredients. These compounds play an important role in human health. Prior to establishing the safety and health benefits of these compounds, they must first be isolated, purified, and their physico-chemical properties established. Once identified, their mechanisms of actions are studied. The chapters are arranged in the order from isolation, purification and identification to in vivo and clinical studies, there by covering not only the analytical procedures used but also their nutraceutical and therapeutic properties.

The authors of this thematic issue provide a comprehensive summary of most recent knowledge and references on quality control in wide fields. Quality control is essential for natural products like natural medicine and related food products. In this issue fifteen chapters have been included, discussing in detail various aspects of quality control. It will certainly prove useful not only for phytochemical researchers, but also many scientists working in numerous fields. Much effort has been invested by the contributors to share current information. Without their efforts and input 'Quality Control of Herbal Medicine and Related Areas' could not exist.

The 2016 International Conference on Materials Science, Energy Technology and Environmental Engineering (MSETEE 2016) took place May 28-29, 2016 in Zhuhai City, China. MSETEE 2016 brought together academics and industrial experts in the field of materials science, energy technology and environmental engineering. The primary goal of the conference was to promote research and developmental activities in these research areas and to promote scientific information interchange between researchers, developers, engineers, students, and practitioners working around the world. The conference will be held every year serving as platform for researchers to share views and experience in materials science, energy technology and environmental engineering and related areas.

The book provides the broad knowledge on electromigration techniques including: theory of CE, description of instrumentation, theory and practice in micellar electrokinetic chromatography, isotachophoresis, capillary isoelectric focusing, capillary and planar electrochromatography (including description of instrumentation and packed and monolithic column preparation), 2D-gel electrophoresis (including sample preparation) and lab-on-a-chip systems. The book also provides the most recent examples of

applications including food, environmental, pharmaceutical analysis as well as proteomics.

Amstat News asked three review editors to rate their topfive favorite books in the September 2003 issue. Methods ofMultivariate Analysis was among those chosen. When measuring several variables on a complex experimental unit,it is often necessary to analyze the variables simultaneously,rather than isolate them and consider them individually.Multivariate analysis enables researchers to explore the jointperformance of such variables and to determine the effect of eachvariable in the presence of the others. The Second Edition of AlvinRencher's Methods of Multivariate Analysis provides studentsof all statistical backgrounds with both the fundamental and moresophisticated skills necessary to master the discipline. To illustrate multivariate applications, the author providesexamples and exercises based on fifty-nine real data sets from awide variety of scientific fields. Rencher takes a "methods"approach to his subject, with an emphasis on how students andpractitioners can employ multivariate analysis in real-lifesituations. The Second Edition contains revised and updatedchapters from the critically acclaimed First Edition as well asbrand-new chapters on: Cluster analysis Multidimensional scaling Correspondence analysis Biplots Each chapter contains exercises, with corresponding answers andhints in the appendix, providing students the opportunity to testand extend their understanding of the subject. Methods ofMultivariate Analysis provides an authoritative reference forstatistics students as well as for practicing scientists andclinicians.

In the field of Analytical Chemistry and, in particular, whenever a quali-quantitative analysis is required, until a few years ago, reference was made

exclusively to instrumental methods (more or less hyphenated) which, once validated, were able to provide the answers to the questions present, even if only in a limited way to analytical targets. Nowadays, the landscape has become considerably complicated (natural adulterants, assessment of geographical origin, sophistication, need for non-destructive analysis, search for often unknown compounds), and new procedures for processing data have greatly increased the potential of analyses that are conducted (even routinely) in the laboratory. In this scenario, chemometrics is master, able to manage and process a huge amount of information based both on data relating only to the analytes of interest, but also by applying “general” procedures to process raw untargeted analysis data. It is within this strand of analysis that many of the works reported in this Special Issue fall. In the succession of works in this printed version, the criterion that guided us was to highlight how—starting exclusively from chromatographic techniques (HPLC and GC) with conventional detectors and moving to exclusively spectroscopic techniques (MS, FT-IR and Raman)—it is possible arrive at extremely powerful coupled techniques and procedures (HPLC and FT-IR) able to meet research needs. Finally, at the end of the printed volume, there are two reviews that surveying the state of the art regarding the assessment of authenticity through qualitative analyses and the

application of chemometrics in the pharmaceutical field in the study of forced drug degradation products. From the succession of works (and, above all, from the various application fields) it can immediately be seen how the application of chemometrics and its procedures to both raw and processed data is a powerful means of obtaining robust, reproducible, and predictive information. In this manner, it is possible to create models able to explain and respond to the original problem in a much more detailed way. , and Honghe through Fourier transform mid infrared (FT-MIR) spectra combined with partial least squares discriminant analysis (PLS-DA), random forest (RF), and hierarchical cluster analysis (HCA) methods. Melucci and collaborators apply chemometric approaches to non-destructive analysis of ATR-FT-IR for the determination of biosilica content. This value was directly evaluated in sediment samples, without any chemical alteration, using attenuated total reflection Fourier transform infrared (ATR-FTIR) spectroscopy, and the quantification was performed by combining the multivariate standard addition method (MSAM) with the net analyte signal (NAS) procedure to solve the strong matrix effect of sediment samples. Still in the food and food supplements field, Anguebes-Franseschi and collaborators report an article where 10 chemometric models based on Raman spectroscopy were applied to predict the

physicochemical properties of honey produced in the state of Campeche, Mexico.

Evidence based herbal drugs are on hi-acceptance day by day due to health friendly nature compared to synthetic drugs. The active ingredients in herbal drugs are different chemical classes, e.g. alkaloids, coumarins, flavonoids, glycosides, phenols, steroids, terpenes etc., are identified at molecular level using current analytical practices, which are unique characteristic, as finger, so known as fingerprints. The fingerprints are used for assessment of quality consistency and stability by visible observation and comparison of the standardized fingerprint pattern, have scientific potential to decipher the claims made on these drugs for authenticity and reliability of chemical constituents, with total traceability, which starts from the proper identification, season and area of collection, storage, their processing, stability during processing, and rationalizing the combinational in case of polyherbal drugs. These quality oriented documents have ample scientific logics so well accepted globally by regulatory authorities and industries, to determine intentional/ unintentional contamination, adulteration, pollutants, stability, quality, etc. parameters. Based on geo-climatic factors, a same plant species has different pharmacological properties due to different ingredients; such regional and morphological variations are identified by fingerprints, at the time of

collection of the medicinal herb. The chromatographic (TLC, HPTLC, HPLC, GC,) and spectral (UV-Vis., FTIR, MNR, MS, LC-MS, GC-MS etc.) techniques have world-wide strong scientific approval as validated methods to generate the fingerprints of different chemical classes of active ingredients of herbal drugs. Presently there is a need for a book having all the fingerprinting techniques for herbal drugs at a place with theory, case studies and art to discover patentable forms. The present book is a mile stone in the subject, to be utilized by Scientists, Medical Doctors, Technicians, Industrialists, Researchers, and Students both in PG and UG levels.

High-Performance Thin-Layer Chromatography for the Analysis of Medicinal Plants presents the theoretical and technical information needed to perform reliable and reproducible high-performance thin-layer chromatography (HPTLC) to establish the identity, purity, quality, and stability of raw materials, extracts, and finished botanical products. The text provides a complete overview of the technique and common applications of HPTLC in herbal analysis. It will help the analyst answer questions such as: Am I paying for a high-quality material, but getting a cheap adulterant? Is this raw material worth its price? Does this product comply with the claim on its label? Has the composition of this product changed after being on the shelf for more than a year?

Practical examples provided by renowned experts help the reader gain a firm understanding of HPTLC methodologies. More than 300 full-color illustrations aid comprehension of complex concepts, and easy-to-reference text boxes provide summaries of key information.This book is essential for analysts, quality assurance professionals, and regulators seeking a comprehensive text on how to use HPTLC to determine whether botanicals comply with current, good manufacturing practices. It will also benefit students in pharmacognosy, phytopharmacy, pharmaceutical biology, and analytical chemistry programs.

Due to the increase in the consumption of herbal medicine, there is a need to know which scientifically based methods are appropriate for assessing the quality of herbal medicines. Fingerprinting has emerged as a suitable technique for quality estimation. Chemical markers are used for evaluation of herbal medicines. Identification and quantification of these chemical markers are crucial for quality control of herbal medicines. This book provides updated knowledge on methodology, quality assessment, toxicity analysis and medicinal values of natural compounds.

This package contains vols. I, II, and III and thus constitutes a comprehensive and valuable source on the most commonly used herbal drugs in Traditional Chinese Medicine.

Phytonutrients - The natural drugs of the future -- Research on the supercritical CO, extraction of Xinyang MaoJian tea -- Applications of RNAi technology -- Enhancing bioactive molecules in medicinal plants -- Biotransformation of taxanes from cell cultures of Taxus sp -- Biotransformation of terpenes and steroids by fungi -- Rapid analysis of triterpenoid saponins in plant extract Using ESI-MSn and LC-MSn -- HPLC-MS Analysis of phenolic constituents of PhyZZanthus Amarus -- Structure elucidation of norditerpene alkaloids from Ranunculaceae species -- Quantitative detection of isoflavones in the extract of Red Clover by HPLC/ESI-MS -- Measurement of bioactive constituents in traditional chinese medicines by CE with electrochemical detection -- Chemical constituents of Aegiceras corniculatum -- Norditerpenoids from the soft coral Nephthea chabroli -- The metabolites of the mangrove fungus Xylaria sp (2508) -- Phytochemical evaluation of polyherbal formulations using HPTLC -- Application of chromatographic fingerprint to quality control for Clematis chinensis -- The bioactive pigments from marine bacteria Pseudomonas sp -- Bioactive natural products from marine sponges -- Anti-inflammatory and neurotrophic alkaloids fi-om higher plants and fungi -- Effects of bovine kidney heparan sulphate and shark cartilage Chondroitin-6-Sulphate on palatal fibroblast activities -- Effects of the

cultured Cordyceps Exopolysaccharide fraction (Epsf) on some parameters of mouse immune function In Evo and In Etro -- Lactobacillus rhamnosus induces differential anti-proliferative responses and Interleulun-6 expression levels in SV-40 and malignant uroepithelial cells -- Cruciferous vegetables and chemoprotection - A role of ITC-mediated apoptosis -- Tanshinone I and Tanshinone IIA from Salvia Miltiorrhiza inhibit growth of K1735M2 murine melanoma Cells via different pathways -- New pesticidal compounds from limonoids -- Insecticidal properties of Anacardiurn Occidentale L. -- Antibacterial effect of extracts from persimmon leaves -- Protective effect of crocin on rat heart Ischemia-Reperfusion injury: Possible mechanisms -- Protective effects of Herba Leonuri in Ischemic models -- The prophylactic effects of chinese herbal extract, Braintone,on stroked Wistar rats -- Therapeutic applications of Ceylon tea: Potential and trends -- Effects of green and black tea on glucose tolerance, serum insulin antioxidant enzyme levels in Streptozotocin-induced diabetes rats -- St John's Wort: A precious gift from the saints? -- From medicine man to market: A look at natural products and the pharmaceutical industries This book, Drug Discovery Research in Pharmacognosy provides a full picture of research in the area of pharmacognosy with the goal of drug discovery from natural products based on the

traditional knowledge or practices. Several plants that have been used as food show their potential as chemopreventive agents and the claims of many medicinal plants used in traditional medicine are now supported by scientific studies. Drug Discovery Research in Pharmacognosy is a promising road map which will help us find medicine for all!

A collection of test procedures for assessing the identity, purity, and content of medicinal plant materials, including determination of pesticide residues, arsenic and heavy metals. Intended to assist national laboratories engaged in drug quality control, the manual responds to the growing use of medicinal plants, the special quality problems they pose, and the corresponding need for international guidance on reliable methods for quality control. Recommended procedures - whether involving visual inspection or the use of thin-layer chromatography for the qualitative determination of impurities - should also prove useful to the pharmaceutical industry and pharmacists working with these materials.

Volume IV of this manual provides an overview of the analytical investigation of numerous additional Chinese Herbal Drugs, which are most commonly used in Traditional Chinese Medicine (TCM). The detailed chromatographic analysis of the main compounds is illustrated in coloured TLC-photographs and HPLC-peak profiles. Further

bioactive properties, pharmacological and biological activities of all single herbal drugs, as well as their therapeutic applications are discussed. Together with Volumes I - III this current volume represents the most comprehensive overview to analytical studies of those herbal drugs on the market and therefore serves as a must-have manual for researchers and laboratories dedicated to TCM. The quality proof of the investigation meets the standard of the European Drug Regulatory Authority.

Chemometrics uses advanced mathematical and statistical algorithms to provide maximum chemical information by analyzing chemical data, and obtain knowledge of chemical systems. Chemometrics significantly extends the possibilities of chromatography and with the technological advances of the personal computer and continuous development of open-source software, many laboratories are interested in incorporating chemometrics into their chromatographic methods. This book is an up-to-date reference that presents the most important information about each area of chemometrics used in chromatography, demonstrating its effective use when applied to a chromatographic separation.

The determination of food authenticity is a vital component of quality control. Its importance has been highlighted in recent years by high-profile cases in the global supply chain such as the

European horsemeat and the Chinese melamine scandals, the latter of which led to six fatalities and the hospitalization of thousands of infants. As well as being a safety concern, authenticity is also a quality criterion for food and food ingredients. Consumers and retailers demand that the products they purchase and sell are what they purport to be. This book covers the most advanced techniques used for the authentication of a vast number of products around the world. The reader will be informed about the latest pertinent analytical techniques. Chapters focus on the novel techniques and markers that have emerged in recent years. An introductory section presents the concepts of food authentication, while the second section examines in detail the analytical techniques for the detection of fraud relating to geographical, botanical, species, and processing origin and production methods of food materials and ingredients. Finally, the third section looks at consumer attitudes towards food authenticity, the application of bioinformatics to this field, and the Editor's conclusions and future outlook. Beyond being a reference for researchers working in food authentication, this book will serve as an essential resource for analytical scientists interested in the field and food scientists aiming to appreciate analytical approaches. This book will be a companion to under- and postgraduate students in their studies in food authentication, and will be useful

to researchers in universities and research institutions.