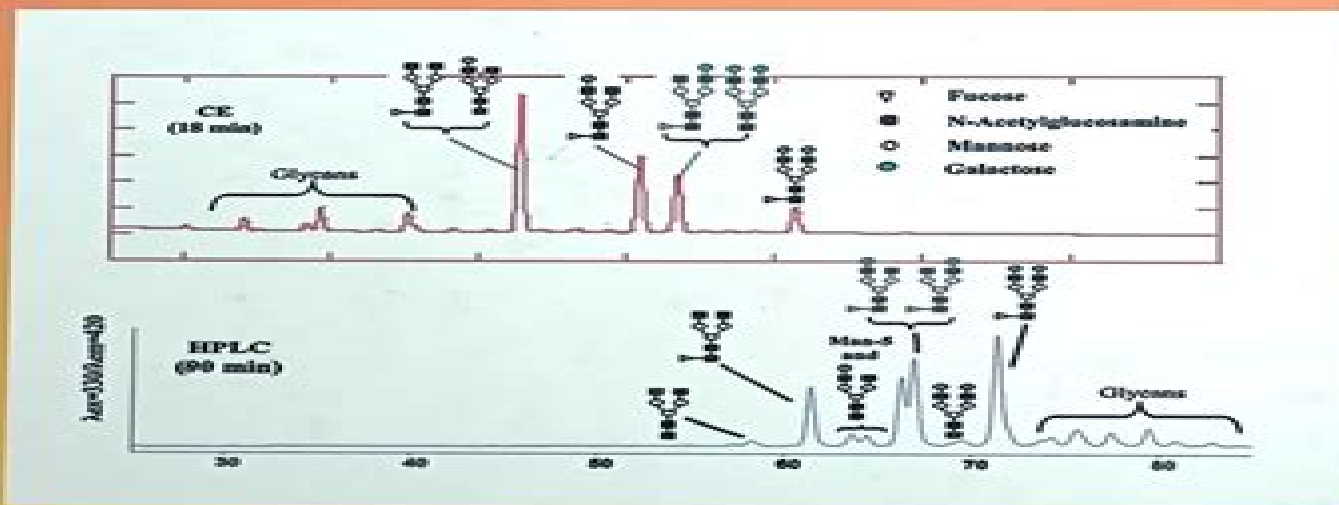




CAPILLARY ELECTROPHORESIS METHODS FOR PHARMACEUTICAL ANALYSIS

Edited by
Satinder Ahuja
M. Ilias Jimidar



VOLUME 9

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SEPARATION SCIENCE AND TECHNOLOGY

Capillary Electrophoresis Methods For Pharmaceutical Analysis

Kevin D. Altria



Capillary Electrophoresis Methods For Pharmaceutical Analysis:

Capillary Electrophoresis Methods for Pharmaceutical Analysis Satinder Ahuja, Mohamedilias Jimidar, 2011-08-09

Capillary electrophoresis CE is a powerful analytical technique that is widely used in research and development and in quality control of pharmaceuticals. Many reports of highly efficient separations and methods have been published over the past 15 years. CE offers several advantages over high pressure or high performance liquid chromatography (HPLC). These include simplicity, rapid analysis, automation, ruggedness, different mechanisms for selectivity, and low cost. Moreover, CE requires smaller sample size and yet offers higher efficiency and thus greater resolution power over HPLC. These characteristics are very attractive in research and development, even more so in pharmaceutical quality control (QC) and stability monitoring (SM) studies. This book will provide busy pharmaceutical scientists a complete yet concise reference guide for utilizing the versatility of CE in new drug development and quality control. It provides current status and future developments in CE analysis of pharmaceuticals. It explains how to develop and validate methods. It includes major pharmaceutical applications including assays and impurity testing.

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Capillary Electrophoresis Methods For Pharmaceutical Analysis Ahuja, 2009-01-01

Analysis of Pharmaceuticals by Capillary Electrophoresis Kevin D. Altria, 2013-04-17

During the 1980s the analysis of pharmaceuticals was dominated by the use of High Performance Liquid Chromatography (HPLC). Other separative techniques such as Gas Chromatography and Thin Layer Chromatography offered alternatives, but their quantitative capabilities and/or solute range could not approach that of HPLC. The majority of pharmaceuticals are ionic, and it would be reasonable to assume that electrophoresis may be useful in the analysis of pharmaceuticals. However, the electrophoretic instruments

available in the 1980 s were labour intensive and employed post separation detection procedures During the late 1980 s and early 1990 s extensive research was conducted into the possibilities of conducting electrophoretic separations in capillaries This approach allowed on line detection and could be performed on fully automated equipment This research led to the advent of modern day capillary electrophoresis CE instruments which offer similar performance and automation levels to that of HPLC Research was also focused on developing applications for CE and particular attention was paid to applications within the pharmaceutical analysis area These applications proved that CE could be applied to a wide range of drug types including water insoluble and neutral compounds The ability to achieve efficient chiral separations of drugs also increased the popularity of the technique CE with indirect UV detection has become established as a simple and effective alternative to ion exchange chromatography for the determination of small inorganic or organic ions

Studies of Capillary Electrophoresis as an Analytical Technique in Pharmaceutical Analysis Karin Stubberud,1998

Employing Capillary Electrophoresis as a Separation Method for Pharmaceutical Analysis Laura L. Lessard,2004 Capillary electrophoresis as a technique has many applications in a broad range of fields including forensics environmental analysis and biological analysis and as a separation method for samples such as oligonucleotides peptides proteins and pharmaceuticals The research conducted herein is for the antibiotic pharmaceutical ciprofloxacin HCl and three impurities Sample stacking was used to overcome the poor limits of detection generally associated with CE which successfully improved the limits of detection when compared to results from a previous feasibility study This thesis encompasses three stages method development limit of detection determination and proof of successful method development by analysis of tablets of ciprofloxacin The method developed is reproducible yields high resolution and provides intense signals with respect to the detection generally achievable with capillary electrophoresis The limits of detection of the impurities were determined to be below 0.05% by concentration of that of the active ingredient and a brief tablet analysis showed that formulated tablets could be analyzed with this method

Chiral Capillary Electrophoresis in Current Pharmaceutical and Biomedical Analysis Peter Mikuš,2012-08-29 The scientific monograph by the author Peter Mikus entitled Chiral Capillary Electrophoresis in Current Pharmaceutical and Biomedical Analysis provides a comprehensive view on the advanced capillary electrophoresis techniques aimed to current chiral bioanalysis The advances in the chiral electrophoresis analytical approaches are divided and theoretically described in three sections involving i advanced chiral separations for the optimization of chiral resolution separation mechanisms electrophoresis techniques in capillary and microchip format electrophoretic modes such as ITP CZE EKC CEC chiral additives pseudophases phases ii advanced sample preparation for the on line preconcentration sample clean up and analyte derivatization implementation of electrophoretic effects such as stacking non electrophoretic effects such as SPE chromatography dialysis combinations of these effects multidimensional CE systems instrumental schemes iii advanced combinations of detection and electrophoresis for the optimization in qualitative

and quantitative evaluation the most important universal as well as selective detection approaches such as absorption and fluorescence spectrophotometry electrochemical detection mass spectrometry vs i and or ii Real analytical potential benefits and limitations of these advanced analytical approaches is emphasized by selected performance parameters of the methods and illustrated by many current practical applications including chiral analyses of drugs their bio degradation products and biomarkers in pharmaceutical and biological matrices The author wishes the readers many inspirations in the creation of new innovative approaches in the field of advanced chiral electrophoresis techniques with the aim to overcome capabilities of the current analytical techniques

Encyclopedia of Analytical Science, 2019-04-02 The third edition of the Encyclopedia of Analytical Science Ten Volume Set is a definitive collection of articles covering the latest technologies in application areas such as medicine environmental science food science and geology Meticulously organized clearly written and fully interdisciplinary the Encyclopedia of Analytical Science Ten Volume Set provides foundational knowledge across the scope of modern analytical chemistry linking fundamental topics with the latest methodologies Articles will cover three broad areas analytical techniques e g mass spectrometry liquid chromatography atomic spectrometry areas of application e g forensic environmental and clinical and analytes e g arsenic nucleic acids and polycyclic aromatic hydrocarbons providing a one stop resource for analytical scientists Offers readers a one stop resource with access to information across the entire scope of modern analytical science Presents articles split into three broad areas analytical techniques areas of application and and analytes creating an ideal resource for students researchers and professionals Provides concise and accessible information that is ideal for non specialists and readers from undergraduate levels and higher

Ewing's Analytical Instrumentation Handbook, Fourth Edition Nelu Grinberg, Sonia Rodriguez, 2019-02-21 This handbook is a guide for workers in analytical chemistry who need a starting place for information about a specific instrumental technique It gives a basic introduction to the techniques and provides leading references on the theory and methodology for an instrumental technique This edition thoroughly expands and updates the chapters to include concepts applications and key references from recent literature It also contains a new chapter on process analytical technology

Pharmaceutical and Biomedical Applications of Capillary Electrophoresis S.M. Lunte, D.M. Radzik, 1996-08-13 The book describes the theory and applications of Capillary Electrophoresis CE in the field of pharmaceutical and biomedical analysis It is targeted towards users who are intimately involved in analytical problems especially those which involve small samples This book presents the technique of capillary electrophoresis from the point of view of the serious hands on use in the field of pharmaceutical and biomedical analysis An overview of general theory is presented to acquaint the novice with the fundamental principles A more theoretical approach is taken in the presentation of electrokinetic chromatography The next chapter discusses advances in column technologies the preceding chapters having provided a foundation as to how separations occur In the next three chapters recognized experts in their fields present fundamentals and state of the art techniques in the areas of optical electrochemical and mass

spectrometric detection The major focus of the remaining chapters is on applications This includes the analysis of pharmaceuticals amino acids and peptides macromolecules nucleosides nucleotides and oligonucleotides The use of CE for analysis of small ions and separation of biological particles is also discussed The issue of sample preparation for analysis by CE is addressed especially as it relates to clinical analysis

Capillary Electrophoresis Suvadhan Kanchi, Salvador Sagrado, Myalo I. Sabela, Krishna Bisetty, 2017-08-21 Capillary electrophoresis CE has become an established method with widespread recognition as an analytical technique of choice in numerous analytical laboratories including industrial and academic sectors Pharmaceutical and biochemical research and quality control are the most important CE applications This book provides a comparative assessment of related techniques on mode selection method development detection and quantitative analysis and estimation of pharmacokinetic parameters and broadens the understanding of modern CE applications developments and prospects It introduces the fundamentals of CE and clearly outlines the procedures used to mitigate several barriers such as detection limits signal detection changing capillary environment resolution separation of analytes and hyphenation of mass spectrometry with CE for a range of analytical problems Each chapter outlines a specific electrophoretic variant with detailed instructions and some standard operating procedures In this respect the book meets its desired goal of rendering assistance to lovers of electrophoresis

Bioanalytics Friedrich Lottspeich, Joachim W. Engels, 2018-05-29 Analytical methods are the essential enabling tools of the modern biosciences This book presents a comprehensive introduction into these analytical methods including their physical and chemical backgrounds as well as a discussion of the strengths and weakness of each method It covers all major techniques for the determination and experimental analysis of biological macromolecules including proteins carbohydrates lipids and nucleic acids The presentation includes frequent cross references in order to highlight the many connections between different techniques The book provides a bird s eye view of the entire subject and enables the reader to select the most appropriate method for any given bioanalytical challenge This makes the book a handy resource for students and researchers in setting up and evaluating experimental research The depth of the analysis and the comprehensive nature of the coverage mean that there is also a great deal of new material even for experienced experimentalists The following techniques are covered in detail Purification and determination of proteins Measuring enzymatic activity Microcalorimetry Immunoassays affinity chromatography and other immunological methods Cross linking cleavage and chemical modification of proteins Light microscopy electron microscopy and atomic force microscopy Chromatographic and electrophoretic techniques Protein sequence and composition analysis Mass spectrometry methods Measuring protein protein interactions Biosensors NMR and EPR of biomolecules Electron microscopy and X ray structure analysis Carbohydrate and lipid analysis Analysis of posttranslational modifications Isolation and determination of nucleic acids DNA hybridization techniques Polymerase chain reaction techniques Protein sequence and composition analysis DNA sequence and epigenetic modification analysis Analysis

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Chemical biology *HPLC Methods for Pharmaceutical Analysis* George Lunn, 2000-06-06 HPLC and CE Methods for
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and CZE MS micellar electrokinetic capillary chromatography MEKC capillary gel electrophoresis CGE capillary isoelectric
focusing CIEF capillary isotachopheresis CITP capillary electrochromatography CEC microfluidics and microchips It then

demonstrates the applicability of these techniques to existing and future problems in the analysis of complex mixtures of biochemicals pharmaceuticals environmental and natural products This book will be valuable to separation scientists applications scientists and technicians in industrial outlets including those in pharmaceuticals biomedical biotechnologies and food and environmental industries Students and professors who study separation techniques will also benefit greatly from the book s content Summarizes a wide array of microscale separation techniques Demonstrates the applicability of microscale separation for the reduction of hazardous waste in numerous industries Addresses current and future problems in the field of microscale separation

HPLC Methods for Pharmaceutical Analysis George Lunn, Norman R. Schmuff, 1997 Full text included in Knovel Library within the subject area of Chemistry and Chemical Engineering

HPLC Methods for Pharmaceutical Analysis George Lunn, Norman R. Schmuff, 1997 Full text included in Knovel Library within the subject area of Chemistry and Chemical Engineering

Handbook of Analytical Quality by Design Sarwar Beg, Md Saquib Hasnain, Mahfoozur Rahman, Waleed H Almalki, 2021-01-09 Handbook of Analytical Quality by Design addresses the steps involved in analytical method development and validation in an effort to avoid quality crises in later stages The AQbD approach significantly enhances method performance and robustness which are crucial during inter laboratory studies and also affect the analytical lifecycle of the developed method Sections cover sample preparation problems and the usefulness of the QbD concept involving Quality Risk Management QRM Design of Experiments DoE and Multivariate MVT Statistical Approaches to solve by optimizing the developed method along with validation for different techniques like HPLC UPLC UFLC LC MS and electrophoresis This will be an ideal resource for graduate students and professionals working in the pharmaceutical industry analytical chemistry regulatory agencies and those in related academic fields Concise language for easy understanding of the novel and holistic concept Covers key aspects of analytical development and validation Provides a robust flexible operable range for an analytical method with greater excellence and regulatory compliance

Capillary Electrophoresis for Food Analysis Richard A Frazier, Jennifer M Ames, H E Nursten, 2007-10-31 Since its inception in the early 1980s capillary electrophoresis CE offers a great deal of flexibility as a modern analytical technique and has found applications within many fields of analysis particularly pharmaceutical science and biochemistry Until now food analysts have had difficulties in adopting the technique due to the lack of written guidance Capillary Electrophoresis for Food Analysis Method Development provides basic information and the support needed to enable food analysts to utilise the technique for the development of new separation methods Designed specifically for the needs of food analysts the book takes the reader step by step through the process of developing and troubleshooting CE methods Worked examples are included to make it ideal as a laboratory companion as well as a library reference source

Capillary Electrophoresis S.F.Y. Li, 1992-07-31 Capillary Electrophoresis CE has had a very significant impact on the field of analytical chemistry in recent years as the technique is capable of very high resolution separations requiring only small amounts of samples and reagents Furthermore

it can be readily adapted to automatic sample handling and real time data processing Many new methodologies based on CE have been reported Rapid reproducible separations of extremely small amounts of chemicals and biochemicals including peptides proteins nucleotides DNA enantiomers carbohydrates vitamins inorganic ions pharmaceuticals and environmental pollutants have been demonstrated A wide range of applications have been developed in greatly diverse fields such as chemical biotechnological environmental and pharmaceutical analysis This book covers all aspects of CE from the principles and technical aspects to the most important applications It is intended to meet the growing need for a thorough and balanced treatment of CE The book will serve as a comprehensive reference work Both the experienced analyst and the newcomer will find the text useful

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