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Error-Tolerant Biochemical Sample Preparation with Microfluidic Lab-on-Chip Sudip Poddar 2022-07-27 Microfluidic biochips have gained prominence due to their versatile applications to biochemistry and health-care domains such as point-of-care clinical diagnosis of tropical and cardiovascular diseases, cancer, diabetes, toxicity analysis, and for the mitigation of the global HIV crisis, among others. Microfluidic Lab-on-Chips (LoCs) offer a convenient platform for emulating various fluidic operations in an automated fashion. However, because of the inherent uncertainty of fluidic operations, the outcome of biochemical experiments performed on-chip can be erroneous even if the chip is tested a priori and deemed to be defect-free. This book focuses on the issues encountered in reliable sample preparation with digital microfluidic biochips (DMFBs), particularly in an error-prone environment. It presents state-of-the-art error management techniques and underlying algorithmic challenges along with their comparative discussions. Describes a comprehensive framework for designing a robust and error-tolerant biomedical system which will help in migrating from cumbersome medical laboratory tasks to small-sized LOC-based systems Presents a comparative study on current error-tolerant strategies for robust sample preparation using DMFBs and reports on efficient algorithms for error-tolerant sample dilution using these devices Illustrates how algorithmic engineering, cyber-physical tools, and software techniques are helpful in implementing fault tolerance Covers the challenges associated with design automation for biochemical sample preparation Teaches how to implement biochemical protocols using software-controlled microfluidic biochips Interdisciplinary in its coverage, this reference is written for practitioners and researchers in biochemical, biomedical, electrical, computer, and mechanical engineering, especially those involved in LOC or bio-MEMS design.

Laboratory Methods in Food Microbiology W. F. Harrigan 1998-09-28 Basic methods; Techniques for the microbiological examination of foods; Microbiological examination of specific foods; Schemes for the identification of microorganisms.

Schizosaccharomyces pombe Teresa L. Singleton 2019-06-04 This volume presents various laboratory protocols, reviews, specific techniques and applications related to *Schizosaccharomyces pombe*. Written in the highly successful *Methods in Molecular Biology* series format, chapters include introductions to their respective topics, lists of the necessary materials and reagents, step-by-step, readily reproducible laboratory protocols, and tips on troubleshooting and avoiding known pitfalls. Authoritative and practical, *Schizosaccharomyces pombe: Methods and Protocols* hopes to serve as an excellent resource for faculty researchers, undergraduate student researchers, graduate researchers, government, and the medical community.

Biotechnology: Genetic engineering, mutagenesis, separation technology Jack G. Chirikjian 1995 Vol. II The work presented in these two volumes is the collaborative effort of over twenty undergraduate science faculty, whose common goal was to develop a text of unique and flexible laboratory activities focusing on the theory and practice of biotechnology for undergraduate students. The books are designed to provide flexibility for easy integration into any course in the life sciences with an experimental emphasis.

Biochemistry Laboratory Manual For Undergraduates Timea Gerczei Fernandez 2015-03-11 Biochemistry laboratory manual for undergraduates – an inquiry based approach by Gerczei and Pattison is the first textbook on the market that uses a highly relevant model, antibiotic resistance, to teach seminal topics of biochemistry and molecular biology while incorporating the blossoming field of bioinformatics. The novelty of this manual is the incorporation of a student-driven real real-life research project into the undergraduate curriculum. Since students test their own mutant design, even the most experienced students remain engaged with the process, while the less experienced ones get their first taste of biochemistry research. Inclusion of a research project does not entail a limitation: this manual includes all classic biochemistry techniques such as HPLC or enzyme kinetics and is complete with numerous problem sets relating to each topic.

Chemical Recognition in Biology F. Chapeville 2012-12-06 Studies of chemical recognition in biology were initiated about half a century ago with the first kinetic data obtained on enzyme catalysis and inhibition. They led to a rather static representation of the recognition process illustrated by the lock and key model that still continues to influence our overall image of recognition and its specificity. In several cases, crystallographic studies of enzyme-substrate complexes have supported this model. Indeed, in a crystallized ligand-enzyme complex, a close fitting is observed between the active center of the enzyme and the functional groups of the ligand. However, this does not necessarily result from a direct recognition process between rigid structures, but may result from a progressive adaptation during which the initial structures of the enzyme and the ligand are modified (induced-fit mechanism). Recently, a great deal of work has been devoted to the study of recognition in more complex systems such as the replication or the translation machinery; clearly, the extraordinary precision of such systems cannot be explained solely in terms of physical matching between enzymes and their substrates. This has led to a noticeable change of perspective in these areas. As a result of the new kinetic viewpoint, one rather focuses on the time-course of the processes, on the kinetic balance between steps of the reaction, on the energy-accuracy relationships and on the strategies which permit the achievement of high precision using relatively error-prone components in an appropriate dynamic interplay.

Laboratory Manual on Biotechnology P. M. Swamy 2008

[Making Skill Standards Work](#) 1999

Laboratory Methods in Dynamic Electroanalysis M. Teresa Fernández Abedul 2019-10-13 *Laboratory Methods in Dynamic Electroanalysis* is a useful guide to introduce analytical chemists and scientists of related disciplines to the world of dynamic electroanalysis using simple and low-cost methods. The trend toward decentralization of analysis has made this fascinating field one of the fastest-growing branches of analytical chemistry. As electroanalytical devices have moved from conventional electrochemical cells (10-20 mL) to current cells (e.g. 5-50 mL) based on different materials such as paper or polymers that integrate thick- or thin-film electrodes, interesting strategies have emerged, such as the combination of microfluidic cells and biosensing or nanostructuring of electrodes. This book provides detailed, easy procedures for dynamic electroanalysis and covers the main trends in electrochemical cells and electrodes, including

microfluidic electrodes, electrochemical detection in microchip electrophoresis, nanostructuring of electrodes, development of bio (enzymatic, immuno, and DNA) assays, paper-based electrodes, interdigitated array electrodes, multiplexed analysis, and combination with optics. Different strategies and techniques (amperometric, voltammetric, and impedimetric) are presented in a didactic, practice-based way, and a bibliography provides readers with additional sources of information. Provides easy-to-implement experiments using low-cost, simple equipment Includes laboratory methodologies that utilize both conventional designs and the latest trends in dynamic electroanalysis Goes beyond the fundamentals covered in other books, focusing instead on practical applications of electroanalysis

Modern Analytical Chemistry David Harvey 2000 Modern Analytical Chemistry is a one-semester introductory text that meets the needs of all instructors. With coverage in both traditional topics and modern-day topics, instructors will have the flexibility to customize their course into what they feel is necessary for their students to comprehend the concepts of analytical chemistry.

Beet-Sugar Handbook Mosen Asadi 2006-06-23 The first all-in-one reference for the beet-sugar industry Beet-Sugar Handbook is a practical and concise reference for technologists, chemists, farmers, and research personnel involved with the beet-sugar industry. It covers: * Basics of beet-sugar technology * Sugarbeet farming * Sugarbeet processing * Laboratory methods of analysis The book also includes technologies that improve the operation and profitability of the beet-sugar factories, such as: * Juice-softening process * Molasses-softening process * Molasses-desugaring process * Refining cane-raw sugar in a beet-sugar factory The book ends with a review of the following: * Environmental concerns of a beet-sugar factory * Basics of science related to sugar technology * Related tables for use in calculations Written in a conversational, engaging style, the book is userfriendly and practical in its presentation of relevant scientific and mathematical concepts for readers without a significant background in these areas. For ease of use, the book highlights important notes, defines technical terms, and presents units in both metric and British systems. Operating problem-solving related to all stations of sugarbeet processing, frequent practical examples, and given material/energy balances are other special features of this book.

Analytical Chemistry for Technicians John Kenkel 2002-10-29 Surpassing its bestselling predecessors, this thoroughly updated third edition is designed to be a powerful training tool for entry-level chemistry technicians. Analytical Chemistry for Technicians, Third Edition explains analytical chemistry and instrumental analysis principles and how to apply them in the real world. A unique feature of this edition is that it brings the workplace of the chemical technician into the classroom. With over 50 workplace scene sidebars, it offers stories and photographs of technicians and chemists working with the equipment or performing the techniques discussed in the text. It includes a supplemental CD that enhances training activities. The author incorporates knowledge gained from a number of American Chemical Society and PITTCON short courses and from personal visits to several laboratories at major chemical plants, where he determined firsthand what is important in the modern analytical laboratory. The book includes more than sixty experiments specifically relevant to the laboratory technician, along with a Questions and Problems section in each chapter. Analytical Chemistry for Technicians, Third Edition continues to offer the nuts and bolts of analytical chemistry while focusing on the practical aspects of training.

Materials Processing Technology II Lian Cheng Zhao 2012-06-14 This work comprises papers selected from the 2nd International Conference on Advanced Engineering Materials and Technology (AEMT 2012) which was held on the 15th to 17th June 2012 in Zhuhai, China. The peer-reviewed papers are grouped into sixteen chapters: Thin Films; Surface Engineering/Coatings; Modeling, Analysis and Simulation; Materials Forming; Materials Machining; Welding and Joining; Mechanical Behavior and Fracture; Computer Aided Material Design; Laser Processing Technology; Theory and Application of Friction and Wear; Dynamic Mechanical Analysis, Optimization and Control; Thermal Engineering Theory and Applications; Precision Manufacturing Technology and Measurements; Material Physics and Chemistry; Dynamic Analysis

of Processing; Advanced Design Technology.

Basic Concepts in Clinical Biochemistry: A Practical Guide Vijay Kumar 2018-03-30 This book is a practical guidebook in biochemistry, for medical as well as life sciences' students. The book covers reference values, sample collection procedure and detailed protocol to perform experiments. Each experiment starts with a brief introduction of the protocol, followed by specimen requirements and procedure. The procedures are presented in a very lucid manner and discuss details of calculations and clinical interpretations, The book is divided into 29 chapters, It offers references, general guidelines and abbreviations and provides principles and procedures of clinical biochemistry tests, along with their diagnostic importance.

Biology Lab Basics (Speedy Study Guides) Speedy Publishing 2015-04-24 You are exposed to many different types of hazards in a biology lab but you can curtail these risks by going through the theoretical basics first. This quick study guide teaches you the safe way to prepare solutions, dispose of buffers and chemicals as well as work with equipment and DNA. Safety in the laboratory can be made possible if you order a copy today.

A Handbook of Laboratory Solutions Michael H. Gabb 1967 A concise and handy guide to the numerous recipes for chemical solutions used in laboratories. In each chapter, preparations of one particular use, or related uses, are grouped alphabetically. Where appropriate, the use of the solutions are stated and cross reference made. Should meet most of the everyday requirements of chemistry, physics, biology and engineering laboratories. Contents: - Foreword - Abbreviations - Authors' Note - 1. Solutions-Basic Definitions - Molar and Normal Solutions. Standard Solutions. The Purity of Chemical Substances. 2. Solutions-Handling Techniques - Clean Apparatus. Measuring or Graduated Apparatus. The Pipette. The Burette. Making a Solution of Approximate Concentration. Making Standard Solutions by Weighing. Standardization of Solutions by Titration. Cleaning Solutions. 3. Solutions for Titrations - Primary Standards- 1: Standardization of strong Acids. 2: Standardization of Alkaline Solutions. 3: Standardization of Oxidizing Agents. 4: Precipitation Reactions. 5: Iodine Titrations. Acids and Alkalis. Solutions For Redox Reactions- 1: Oxidizing Agents or Oxidants. 2: Reducing Agents. Precipitation Titrations. Miscellaneous Titration Solutions. 4. Bench Solutions - Acids. Alkalis. Other Inorganic Reagents. 5. Indicators - Acid-base or pH Indicators. Screened Indicators. Mixed Indicators. Water-soluble Indicators. Other pH Indicators. Luminescent Indicators. Universal Indicators. Buffer Solutions. Indicators for Precipitation Titrations. Adsorption Indicators. Starch Indicator for Iodine Titration. Indicators for Redox (Oxidation-reduction) Reactions. Titrimetric or Volumetric Indicators. Indicators for EDTA Titrations. 6. Organic Reagents and others used in Qualitative Analysis 7. Reagents used in Organic Chemistry 8. Biochemical Solutions and Reagents 9. Solutions in Histology 10. Physiological Salines and Culture Solutions Physiological Salines-Animal. Plant Culture Solutions. 11. Miscellaneous Solutions Solutions for Making Indicator Papers. Electrolyte Solutions for Cells and Electrolysis. Appendix Maximum Tolerances in Graduated Glassware Mathematical Tables Atomic Weight Table Simple First Aid Procedures Bibliography index

Managing the Analytical Laboratory Clifford Nilsen 1996-05-31 A clear and concise manual on how to run a quality control testing laboratory efficiently and in compliance. Hundreds of tips and techniques help the reader focus on the essential elements of good laboratory management. This book includes thirty-nine useful SOPs that have evolved from the author's years of practical experience. Fifteen case studies describe typical laboratory problems and offer solutions to them. From how to train analysts, to how to lay out the laboratory, to how to assure that samples are processed in a systematic manner, Managing the Analytical Laboratory: Plain and Simple covers it all. Features

Buffers for pH and Metal Ion Control D. Perrin 2012-12-06 This book is intended as a practical manual for chemists, biologists and others whose work requires the use of pH or metal-ion buffers. Much information on buffers is scattered throughout the literature and it has been our endeavour to select data and instructions likely to be helpful in the choice of suitable buffer substances and for the preparation of appropriate solutions. For details of pH measurement and

the preparation of standard acid and alkali solutions the reader is referred to a companion volume, A. Albert and E. P. Serjeant's *The Determination of Ionization Constants* (1971). Although the aims of the book are essentially practical, it also deals in some detail with those theoretical aspects considered most helpful to an understanding of buffer applications. We have cast our net widely to include pH buffers for particular purposes and for measurements in non-aqueous and mixed solvent systems. In recent years there has been a significant expansion in the range of available buffers, particularly for biological studies, largely in consequence of the development of many zwitterionic buffers by Good et al. (1966). These are described in Chapter 3.

Basic Biochemical Laboratory Procedures and Computing R. Cecil Jack 1995-05-25 This book reviews the theoretical basis for many biophysical chemistry techniques commonly used in the biochemistry laboratory, and emphasizes the usefulness of computer spreadsheets in solving quantitative problems related to these methods.

Chemistry 2e Paul Flowers 2019-02-14

Biochemistry Laboratory Manual For Undergraduates Timea Gerczei Fernandez 2015-01-01

Biochemistry laboratory manual for undergraduates – an inquiry based approach by Gerczei and Pattison is the first textbook on the market that uses a highly relevant model, antibiotic resistance, to teach seminal topics of biochemistry and molecular biology while incorporating the blossoming field of bioinformatics. The novelty of this manual is the incorporation of a student-driven real real-life research project into the undergraduate curriculum. Since students test their own mutant design, even the most experienced students remain engaged with the process, while the less experienced ones get their first taste of biochemistry research. Inclusion of a research project does not entail a limitation: this manual includes all classic biochemistry techniques such as HPLC or enzyme kinetics and is complete with numerous problem sets relating to each topic. *Laboratory Investigations in Molecular Biology* Steven A. Williams 2007 *Laboratory Investigations in Molecular Biology* presents well-tested protocols in molecular biology that are commonly used in currently active research labs. It is an ideal laboratory manual for college level courses in molecular biology. Because of the modular organization of the manual, laboratory courses can be assembled that would be ideal for science professionals, graduate students, undergraduate students and even advanced high school students in AP courses. The manual is also intended to be useful as a laboratory "bench reference". The experiments are designed to guide students through realistic research projects and to provide students with instruction in methods and approaches that can be immediately translated into research projects conducted in modern research laboratories. Although these experiments have been conducted and optimized over 20 years of teaching the New England Biolabs Molecular Biology Summer Workshops, they are real research projects, not "canned" experiments. Based on extensive teaching experience using these protocols, the authors have found that conducting these experiments as described in these protocols serves to effectively instruct students and science professions in the basic methods of molecular biology. An additional unique feature is that the protocols described in the manual are accompanied by available reagent kits that provide quality-tested, pre-packaged reagents to ensure the successful application of these protocols in a laboratory course setting.

Laboratory Manual for Biotechnology Verma, Ashish S./ Das Surajit & Singh Anchal 2014
Laboratory Manual in Biotechnology Students

Food Analysis Laboratory Manual S. Suzanne Nielsen 2017-06-07 This third edition laboratory manual was written to accompany *Food Analysis, Fifth Edition*, by the same author. New to this third edition of the laboratory manual are four introductory chapters that complement both the textbook chapters and the laboratory exercises. The 24 laboratory exercises in the manual cover 21 of the 35 chapters in the textbook. Many of the laboratory exercises have multiple sections to cover several methods of analysis for a particular food component or characteristic. Most of the laboratory exercises include the following: background, reading assignment, objective, principle of method, chemicals, reagents, precautions and waste disposal, supplies, equipment, procedure, data and calculations, questions, and references. This laboratory manual is ideal for the laboratory

portion of undergraduate courses in food analysis.

Biochemistry Reginald H. Garrett 2016-02-11 Continuing Garrett and Grisham's innovative conceptual and organizing Essential Questions framework, BIOCHEMISTRY guides students through course concepts in a way that reveals the beauty and usefulness of biochemistry in the everyday world. Offering a balanced and streamlined presentation, this edition has been updated throughout with new material and revised presentations. For the first time, this book is integrated with OWL, a powerful online learning system for chemistry with book-specific end-of-chapter material that engages students and improves learning outcomes. Important Notice: Media content referenced within the product description or the product text may not be available in the ebook version.

Exercises for the Molecular Biology Laboratory Patrick Guilforce 2000

Instructor's Manual for Laboratory Preparation to Accompany Biology Laboratory Manual Darrell S. Vodopich 1989

CliffsNotes AP Chemistry Bobrow Test Preparation Services 2009-02-09 The book itself contains chapter-length subject reviews on every subject tested on the AP Chemistry exam, as well as both sample multiple-choice and free-response questions at each chapter's end. Two full-length practice tests with detailed answer explanations are included in the book.

Methods in Practical Laboratory Bacteriology Henrik Chart 1994-08-10 The success of laboratory experiments relies heavily on the technical ability of the bench scientist, with the aid of "tricks-of-the-trade", to generate consistent and reliable data. Regrettably, however, these invaluable "tricks-of-the-trade" are frequently omitted from scientific publications. This paucity of practical information relating to the conduct of laboratory bacteriology experiments creates a gaping void in the pertinent literature. *Methods in Practical Laboratory Bacteriology* fills this void. It provides detailed technical information that ensures that you achieve consistent and reliable data. The book addresses the aspects of bacterial fractionation and membrane characterization, the analysis of Lipopolysaccharides and the techniques of SDS-PAGE, immunoblotting, and ELISA. It also describes the methods used for detecting and quantifying bacterial resistance to antibiotics, and the analysis of bacterial chromosomes by pulsed-field gel electrophoresis (PFGE). *Methods in Practical Laboratory Bacteriology* also covers protocols for extracting the fingerprinting plasmids, as well as the use of non-radio labeled gene probes and ribosomal RNA gene probes.

Integrated Approach to Coordination Chemistry Rosemary A. Marusak 2007-03-30

Coordination chemistry is the study of compounds formed between metal ions and other neutral or negatively charged molecules. This book offers a series of investigative inorganic laboratories approached through systematic coordination chemistry. It not only highlights the key fundamental components of the coordination chemistry field, it also exemplifies the historical development of concepts in the field. In order to graduate as a chemistry major that fills the requirements of the American Chemical Society, a student needs to take a laboratory course in inorganic chemistry. Most professors who teach and inorganic chemistry laboratory prefer to emphasize coordination chemistry rather than attempting to cover all aspects of inorganic chemistry; because it keeps the students focused on a cohesive part of inorganic chemistry, which has applications in medicine, the environment, molecular biology, organic synthesis, and inorganic materials.

Living Along Gradients: Past, Present, Future Ulrich Bathmann 2020-02-24

Lab-on-Chips for Cellomics Albert Berg 2007-09-07 This volume is volume entirely dedicated to microfabricated cell-based systems. It will provide readers with a quick introduction to the field as well as with a variety of specific examples of such Lab-on-Chip systems for cellomics applications. It will give investigators inspiration for innovative research topics, whereas end users will be surprised about the wide variety of new and exciting applications.

Methods in Biotechnology Seung-Beom Hong 2016-08-01 As rapid advances in biotechnology occur, there is a need for a pedagogical tool to aid current students and laboratory professionals in biotechnological methods; *Methods in Biotechnology* is an invaluable resource for those students and professionals. *Methods in Biotechnology* engages the reader by implementing an

active learning approach, provided advanced study questions, as well as pre- and post-lab questions for each lab protocol. These self-directed study sections encourage the reader to not just perform experiments but to engage with the material on a higher level, utilizing critical thinking and troubleshooting skills. This text is broken into three sections based on level – Methods in Biotechnology, Advanced Methods in Biotechnology I, and Advanced Methods in Biotechnology II. Each section contains 14-22 lab exercises, with instructor notes in appendices as well as an answer guide as a part of the book companion site. This text will be an excellent resource for both students and laboratory professionals in the biotechnology field.

Lab Ref Jane Roskams 2002 Table of contents: Section 1 Most Commonly Used Solutions A. Stock Solutions, 1 B. Biological Buffers, 13 C. Proteins, Enzymes, and Antibiotics, 27 D. Reagents for the Analysis, Labeling, and Synthesis of Nucleic Acids, 35 Section 2 Macromolecular Preparation and Purification Reagents A. DNA, 43 B. RNA, 47 C. Protein, 53 Section 3 Electrophoretic Separation of Proteins and Nucleic Acids A. Electrophoresis of DNA, RNA, and Protein, 63 B. Transfer, Hybridization, and Screening of DNA, RNA, and Protein, 81 Section 4 Visualizing Genes and Gene Products A. Use of Antibodies for Immunochemical Approaches: A Guide, 95 B. Fixatives, 101 C. Cytological Stains, Chromogen Substrates, and Fluorophores, 105 D. Mounting Media, 119 E. Microscopy Information, 123 Section 5 Specialized Media, Buffers, and Reagents A. Most Commonly Used Bacterial Media and Solutions, 133 B. Yeast, 139 C. Xenopus, 155 D. Mammalian Cell Culture, 161 Section 6 Storage and Shipment of Biological Samples, 169.

OECD Guidelines for the Testing of Chemicals, Section 1 Test No. 122: Determination of pH, Acidity and Alkalinity OECD 2013-07-26 This Test Guideline describes the procedure for the electronic determination of pH of an undiluted aqueous solution or dispersion, the pH of a dilution of a solution or dispersion in water, or the pH of a chemical diluted to end-use concentration ...

Chemistry, Student Study Guide James E. Brady 2008-01-28 The image on the front cover depicts a carbon nanotube emerging from a glowing plasma of hydrogen and carbon, as it forms around particles of a metal catalyst. Carbon nanotubes are a recently discovered allotrope of carbon. Three other allotropes of carbon-buckyballs, graphite, and diamond-are illustrated at the left, as is the molecule methane, CH₄, from which nanotubes and buckyballs can be made. The element carbon forms an amazing number of compounds with structures that follow from simple methane,

found in natural gas, to the complex macromolecules that serve as the basis of life on our planet. The study of chemistry also follows from the simple to the more complex, and the strength of this text is that it enables students with varied backgrounds to proceed together to significant levels of achievement.

Basic Techniques in Biochemistry, Microbiology and Molecular Biology Aakanchha Jain 2021-03-14 This book presents key methodologies, tools and databases for biochemistry, microbiology and molecular biology in simple and straightforward language. Covering all aspects related to experimental principles and procedures, the protocols included here are brief and clearly defined, and include essential precautions to be taken while conducting experiments. The book is divided into two major sections: one on constructing, working with, and standard operating procedures for laboratory instruments; and one on practical procedures used in molecular biology, microbiology and biochemical analysis experiments, which are described in full. Each chapter describes both the basic theory and relevant practical details for a given experiment, and helps readers recognize both the experiment's potential and limitations. Intended as an intensive introduction to the various tools used in molecular biology, the book covers all basic methods and equipment, including cloning, PCR, spectrophotometers, ELISA readers, sonicators, etc. As such, it offers a valuable asset for final year undergraduate (especially project) students, graduate research students, research scientists and technicians who wish to understand and employ new techniques in the field of biotechnology.

NMR micro-detectors tailored for multinuclear and electrochemistry lab-on-a-chip applications Davoodi, Hossein 2022-01-14 This work offers three solutions tailored to specific applications to overcome NMR challenges in the micro-domain. As the first sub-topic of this work, different potential electrode designs, compatible with NMR technique, are suggested and experimentally evaluated. As the second focus point, this work tackles multinuclear detection challenges. In parallel, a low-cost, broadband insert is discussed to enhance the sensitivity of standard NMR coils when a small sample volume is available.

Laboratory Information Bulletin 1997

Developing Biotechnology and Plant Technology Laboratory Skills and Attitudes in High School Students Robert D. Eicher 1996