

EXPERIMENT 6

HIGH PERFORMANCE LIQUID CHROMATOGRAPHY/HIGH PRESSURE LIQUID CHROMATOGRAPHY (HPLC)

THEORY/ BACKGROUND

In recent years the technology used in chromatographic analysis has greatly improved. Advances in this area have led to the common use of High Performance Liquid Chromatography, a laboratory technique that allows for the very efficient separation of small amounts of the components of a mixture. The technique has essentially the same operational basis as liquid chromatography, but HPLC allows for far better separation of the components of a mixture. The column in an HPLC instrument contains tiny particles of only about 5 μm diameter, ensuring a very large surface area to which molecules may adsorb. These particles comprise the *stationary phase* of the chromatographic system. Because these tiny particles are so tightly packed, the *mobile phase* solvent must be forced through the column under very high pressure. A detector and a computer are connected to the HPLC instrument in order to signal when eluents are coming off the column and fractions should be collected. The diagram in Figure 6 illustrates the main components of an HPLC instrument.

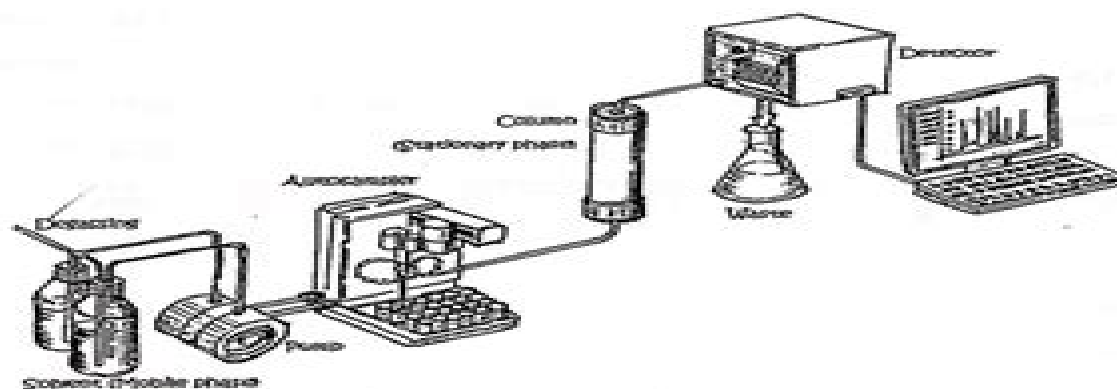


Figure 6.1: Schematic Diagram of a High Performance/ Pressure Liquid Chromatography.

Identification of samples is carried out by comparison of their retention times. A known amount of a known compound (a standard) is injected, the retention time is recorded and the area under the peak can be calculated. A sample containing the same analyte is then injected under the same experimental parameters. If the analyte is the same compound as the standard, then they should give identical retention times. The ratio of peak areas should give the amounts of the components present.

Hplc Lab Manual

Syed Imtiaz Haider, Syed Erfan Asif



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Biochemistry Laboratory Manual Mr. Rohit Manglik, 2024-07-30 Hands on manual with detailed protocols and experiments for conducting fundamental and advanced biochemistry lab work **Food Analysis Laboratory Manual** S. Suzanne Nielsen, 2010-03-20 This second edition laboratory manual was written to accompany Food Analysis Fourth Edition ISBN 978 1 4419 1477 4 by the same author The 21 laboratory exercises in the manual cover 20 of the 32 chapters in the textbook Many of the laboratory exercises have multiple sections to cover several methods of analysis for a particular food component of characteristic Most of the laboratory exercises include the following introduction 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 Laboratory Manual For Undergraduates Timea Gerczei Fernandez, Scott Pattison, 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 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 *Nielsen's Food Analysis Laboratory Manual* B. Pam Ismail, S. Suzanne Nielsen, 2024-06-20 This fourth edition laboratory manual was written to accompany Nielsen's Food Analysis Sixth Edition by the same authors New to this fourth edition of the laboratory manual are three new chapters that complement both the textbook chapters and the laboratory exercises The book again contains four introductory chapters that help prepare students for doing food analysis laboratory exercises The 26 laboratory exercises in the manual cover 24 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 The Science of Ethanol Walter E. Goldstein, 2016-12-08 This book covers all facets involving the production and use of ethanol Topics include the optimization of raw materials energy capital process model based computer control and human resources to produce ethanol It compares and contrasts processes to prepare ethanol using biotechnology processes to prepare ethanol from chemical synthesis Matters of optimization of ethanol use as fuel fuel components are addressed based on thermodynamics kinetics and usage It

also discusses pollutants produced from ethanol and mixtures containing ethanol the status of ways to control these pollutants and what can be done to minimize the harm to the earth's ecosystems due to ethanol and gasoline reactions

HPLC Marvin C. McMaster, 2006-12-18 This Second Edition of the classic handbook details how to set up an HPLC system that capitalizes on the latest innovations It covers new techniques in high temperature micro flow and ultra fast chromatography the linking of an HPLC to a mass spectrometer and more Complete appendices and supplementary material online this guide has everything chromatographers need to know to confidently separate identify purify and quantify compounds

The Organic Chem Lab Survival Manual James W. Zubrick, 2020-02-05 Teaches students the basic techniques and equipment of the organic chemistry lab the updated new edition of the popular hands on guide The Organic Chem Lab Survival Manual helps students understand the basic techniques essential safety protocols and the standard instrumentation necessary for success in the laboratory Author James W Zubrick has been assisting students navigate organic chemistry labs for more than three decades explaining how to set up the laboratory make accurate measurements and perform safe and meaningful experiments This practical guide covers every essential area of lab knowledge from keeping detailed notes and interpreting handbooks to using equipment for chromatography and infrared spectroscopy Now in its eleventh edition this guide has been thoroughly updated to cover current laboratory practices instruments and techniques Focusing primarily on macroscale equipment and experiments chapters cover microscale jointware drying agents recrystallization distillation nuclear magnetic resonance and much more This popular textbook Familiarizes students with common lab instruments Provides guidance on basic lab skills and procedures Includes easy to follow diagrams and illustrations of lab experiments Features practical exercises and activities at the end of each chapter Provides real world examples of lab notes and instrument manuals The Organic Chem Lab Survival Manual A Student's Guide to Techniques 11th Edition is an essential resource for students new to the laboratory environment as well as those more experienced seeking to refresh their knowledge

Quality Control Training Manual Syed Imtiaz Haider, Syed Erfan Asif, 2016-04-19 Written to help companies comply with GMP GLP and validation requirements imposed by the FDA and regulatory bodies worldwide Quality Control Training Manual Comprehensive Training Guide for API Finished Pharmaceutical and Biotechnologies Laboratories presents cost effective training courses that cover how to apply advances in the life sciences to produce commercially viable biotech products and services in terms of quality safety and efficacy This book and its accompanying downloadable resources comprise detailed text summaries test papers and answers to test papers providing an administrative solution for management Provides the FDA Health Canada WHO and EMEA guidelines directly applicable to pharmaceutical laboratory related issues Offers generic formats and styles that can be customized to any organization and help management build quality into routine operations to comply with regulatory requirements Contains ready to use training courses that supply a good source of training material for experienced and inexperienced practitioners in the biotechnology biopharmaceutical

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Purification of Laboratory Chemicals W.L.F. Armarego, Christina Chai, 2009-07-23 A best seller since 1966 Purification of Laboratory Chemicals keeps engineers scientists chemists biochemists and students up to date with the purification of the chemical reagents with which they work the processes for their purification and guides reader on critical safety and hazards for the safe handling of chemicals and processes The Sixth Edition is updated and provides expanded coverage of the latest chemical products and processing techniques safety and hazards The book has been reorganised and is now fully indexed by CAS Registry Numbers Compounds are now grouped to make navigation easier and literature references for all substances and techniques have been added and ambiguous alternate names and cross references have been removed The only comprehensive chemical purification reference a market leader since 1966 Amarego delivers essential information for research and industrial chemists pharmacists and engineers it will be the most commonly used reference book in any chemical or biochemical laboratory MDPI Journal An essential lab practice and procedures manual Improves efficiency results and safety by providing critical information for day to day lab and processing work Improved clear organization and new indexing delivers accurate reliable information on processes and techniques of purification along with detailed physical properties The Sixth Edition has been reorganised and is fully indexed by CAS Registry Numbers compounds are now grouped to make navigation easier literature references for all substances and techniques have been added ambiguous alternate names and cross references removed new chemical products and processing techniques are covered hazards and safety remain central to the book

Practical Chemistry Teshome Aduugna, Girma Salale, 2024-12-30 This laboratory manual offers a broad introduction to practical instrumental analysis The practical activities include experiments for thin layer chromatography paper chromatography gas chromatography high performance liquid chromatography electrophoresis potentiometry voltammetry conductometry coulometry and electrogravimetry

Standard Operating Procedures (Sops) in a Hematology Laboratory Dr. BHUSHAN M. WARPE, Dr. SHWETA S. JOSHI, 2025-09-02 This SOP manual authored by Dr Bhushan and Dr Shweta details essential practices in a Hematology Laboratory to uphold accuracy quality and regulatory compliance It covers core diagnostic procedures including complete blood counts peripheral smear examination ESR reticulocyte counts coagulation profiles and advanced hematology

tests alongside critical quality assurance protocols such as delta checks IQC TAT monitoring sample rejection and disposal guidelines The manual also addresses laboratory safety equipment calibration contingency measures and outsourcing to NABL accredited centers Compliant with NABL 112 NABH 6th edition and ISO 15189 standards it serves as a vital training and operational guide for DMLT BPMT and MD Pathology students With an emphasis on consistency audit preparedness and professional excellence it reflects Swami Vivekananda s insight All knowledge that the world has ever received comes from the mind underscoring the role of mindful structured practice in delivering reliable hematology services **Instrumental**

Liquid Chromatography ,2011-09-22 Instrumental Liquid Chromatography The FBI Laboratory Michael R.

Bromwich,1998-06 This investigation concerned allegations of wrongdoing and improper practices within certain sections of the FBI Lab These involved some of the most significant prosecutions in the recent history of the Dept including the World Trade Center and OK City bombings They implicated fundamental aspects of law enforcement the reliability of the procedures employed to analyze evidence the integrity of the persons engaging in that analysis and the trustworthiness of the testimony by FBI Lab examiners The invest lasted more than 18 months and addressed a large number of allegations most were not substantiated but some important ones were Preservatives and Preservation Approaches in Beverages

Alexandru Grumezescu,Alina Maria Holban,2019-07-17 Preservatives for the Beverage Industry Volume Fifteen a new release in The Science of Beverages series is a valuable resource that discusses preservatives and their impact in the beverage industry including potential health impacts The book takes a broad multidisciplinary approach to explore both conventional and novel approaches of the types and uses of preservatives The latest applications and techniques to reduce the use of non natural or health threatening preservation elements are also covered This is a must have reference for anyone who needs to increase their technical scientific knowledge in this field Includes information on the use of hurdle technology in the preservation of beverages Provides the latest research and impact of antimicrobial use in the beverages industry Presents the benefits and risks of preservatives to ensure safety in beverage products **The FBI Laboratory** United States. Dept. of Justice. Office of the Inspector General,1997 Prevention and Control of Hemoglobinopathies in India Mr. Rohit Manglik,2024-05-24 National guidelines for screening diagnosis and prevention of hemoglobinopathies such as thalassemia and sickle cell disease **A Practical Guide to Monoclonal Antibodies** J. Eryl Liddell,A. Cryer,1991-08-26 Includes all of the information required to produce monoclonal antibodies in the laboratory and to prepare them for use in a multitude of given applications Production procedures are treated in chronological order beginning with basic tissue culture techniques immunization strategies and screening test design followed by production of hybridoma cell lines and basic antibody characterization purification and labeling Each chapter contains explanatory text on each step with comparative analysis of methods where appropriate All necessary experimental protocols are presented in a self contained format that is easy to follow in the laboratory Alternative protocols are provided where relevant for others not included in full source references

are presented Surveys the current status of human hybridoma production and antibody engineering using molecular biology techniques *The Organic Chem Lab Survival Manual* James W. Zubrick,2003-07-31 Publisher Description

Fundamentals of Environmental Sampling and Analysis Chunlong Zhang,2007-03-09 An integrated approach to understanding the principles of sampling chemical analysis and instrumentation This unique reference focuses on the overall framework and why various methodologies are used in environmental sampling and analysis An understanding of the underlying theories and principles empowers environmental professionals to select and adapt the proper sampling and analytical protocols for specific contaminants as well as for specific project applications Covering both field sampling and laboratory analysis Fundamentals of Environmental Sampling and Analysis includes A review of the basic analytical and organic chemistry statistics hydrogeology and environmental regulations relevant to sampling and analysis An overview of the fundamentals of environmental sampling design sampling techniques and quality assurance quality control QA QC essential to acquire quality environmental data A detailed discussion of the theories of absorption spectroscopy for qualitative and quantitative environmental analysis metal analysis using various atomic absorption and emission spectrometric methods and the instrumental principles of common chromatographic and electrochemical methods An introduction to advanced analytical techniques including various hyphenated mass spectrometries and nuclear magnetic resonance spectroscopy With real life case studies that illustrate the principles plus problems and questions at the end of each chapter to solidify understanding this is a practical hands on reference for practitioners and a great textbook for upper level undergraduates and graduate students in environmental science and engineering *Characterization of Proteins* Felix Franks,2007-10-03 Proteins are the servants of life They occur in all component parts of living organisms and are staggering in their functional variety despite their chemical similarity Even the simplest single cell organism contains a thousand different proteins fulfilling a wide range of life supporting roles Their production is controlled by the cell's genetic machinery and a malfunction of even one protein in the cell will give rise to pathological symptoms Additions to the total number of known proteins are constantly being made on an increasing scale through the discovery of mutant strains or their production by genetic manipulation this latter technology has become known as protein engineering The in vivo functioning of proteins depends critically on the chemical structure of individual peptide chains but also on the detailed folding of the chains themselves and on their assembly into larger supramolecular structures The molecules and their functional assemblies possess a limited in vitro stability Special methods are required for their intact isolation from the source material and for their analysis both qualitatively and quantitatively Proteins are also increasingly used as industrial components e.g. in biosensors and immobilized enzymes because of their specificity selectivity and sensitivity This requires novel and refined processing methods by which the protein isolate can be converted into a form in which it can be utilized

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