

Pcmac Macromolecules Webquest

the reception of the original volume by students pedagogues and reviewers has been most gratifying it appears to have both satisfied a need and served a useful educational purpose hence some ten years later it has been deemed advisable to bring it up to date if only in a slightly expanded form the purpose for writing this book and its level remain the same many new polymers have been synthesized in the last decade that have found meaningful and novel uses examples of these applications are included in this new edition major advances have also been made in biophysics and in molecular biology as well as in our understanding of natural

processes on a molecular level foremost among these has been the development of recombinant dna technology with it has come the potential for large scale synthesis of hormones and proteins these new developments have also been incorporated into the present volume it is my hope that this new edition will still have a widespread appeal to students in all of the natural sciences whatever their major interest it should also be of use and interest to those starting industrial or academic careers who have not had an extensive background in macromolecular science

an introduction to macromolecular chemistry covering the structure of macromolecules their properties their applications how they are made and methods used for studying them includes discussion of synthetic materials as well as important biological entities physical and chemical aspects are addressed with a minimum of mathematics

biological macromolecules bioactivity and biomedical applications presents a comprehensive study of biomacromolecules and their potential use in various biomedical applications consisting of four sections the book begins with an overview of the key sources properties and functions of biomacromolecules covering the foundational knowledge required for study on the topic it then progresses to a discussion of the various bioactive components of biomacromolecules individual chapters explore a range of potential bioactivities considering the use of biomacromolecules as nutraceuticals antioxidants antimicrobials anticancer agents and antidiabetics among others the third section of the book focuses on specific applications of biomacromolecules ranging from drug delivery and wound management to tissue engineering and enzyme immobilization this focus on the various practical uses of biological macromolecules provide an interdisciplinary assessment of their function in practice the final section explores the key challenges and future perspectives on biological macromolecules in biomedicine covers a variety of different biomacromolecules including carbohydrates lipids proteins and nucleic acids in plants fungi animals and microbiological resources discusses a range of applicable areas where biomacromolecules play a significant role such as drug delivery wound management and regenerative medicine includes a detailed overview of biomacromolecule bioactivity and properties features chapters on research challenges evolving applications and future perspectives

like so many of its kind this textbook originated from the requirements of teaching while lecturing on macromolecular science as a required subject for chemists and materials scientists on the

undergraduate graduate and postgraduate levels at swiss federal institute of technology at zurich 1960 1971 i needed a one volume textbook which treated the whole field of macromolecular science from its chemistry and physics to its applications in a not too elementary manner this textbook thus intends to bridge the gap between the often oversimplified introductory books and the highly specialized texts and monographs that cover only parts of macromolecular science this first english edition is based on the third german edition 1975 which is about 40 different from the first german edition 1971 a result of rapid progress in macromolecular science and the less rapid education of the writer this text intends to survey the whole field of macromolecular science its organization results from the following considerations the chemical structure of macromolecular compounds should be independent of the method of synthesis at least in the ideal case part i is thus concerned with the chemical and physical structure of macro molecules properties depend on structure solution properties are thus discussed in part ii solid state properties in part iii there are other reasons for discussing properties before syntheses for example it is difficult to understand equilibrium polymerization without knowledge of solution thermody of the glass temperature etc

the second edition of this textbook is identical with its fourth german edi tion and it thus has the same goals precise definition of basic phenomena a broad survey of the whole field integrated representation of chemistry physics and technology and a balanced treatment of facts and comprehension the book thus intends to bridge the gap between the often oversimplified introductory textbooks and the highly specialized texts and monographs that cover only parts of macromolecular science the text intends to survey the whole field of macromolecular science its organization results from the following considerations the chemical structure of macromolecular compounds should be independent of the method of synthesis at least in the ideal case part i is thus concerned with the chemical and physical structure of polymers properties depend on structure solution properties are thus discussed in part ii solid state properties in part iii there are other reasons for discussing properties before synthesis for example it is difficult to understand equilibrium polymerization without knowledge of solution thermodynamics the gel effect without knowledge of the glass transition temperature etc part iv treats the principles of macromolecular syntheses and reactions

macromolecules is an introductory book about macromolecules specifically about the fundamental aspects of macromolecules such as their nature the ways they are formed and their

behavior this book also focuses on the basics of macromolecules which includes history composition and properties the topics covered in this book include polymerization kinetics chemical reactions and degradation of macromolecules this book also discusses biological molecules including naturally occurring materials synthetic macromolecules and model compounds students majoring in chemistry or other related fields such as materials engineering will find this book very useful

in this book we discuss the status of the structure function analysis of biological macromolecules and macromolecular complexes the ultimate goal of the analysis must be to explain all the functional properties of the molecules in question in terms of their completely defined three dimensional structure and the analysis thus contains three separate components the determination of structure the determination and quantitation of function and final correlation of this information into the structure function model the first component the structural analysis is reviewed only briefly and this book therefore leans heavily on barker s and van holde s books in this series for proper background and documentation for this component the second component the analysis of functional properties is given broader consideration chapters i 2 5 and 9 but the main emphasis has been the step by step development of the structure function models it is hoped that this approach will clearly illustrate the typical progression of scientific model building from the first clear definition of the problem and the statement of the hypothesis through ever increasing refinements of experimental tests toward the final answer it is also hoped that the statements of philosophy principles and scientific method that are the bases for this approach are of broad enough validity to survive even after its models have become obsolete with this approach it is essential to inform the reader in unequivocal terms that this book is not a summary of final conclusions and complete stories which can be submitted to memory each system discussed should be considered very critically and the models should be evaluated in terms of the available evidence the only facts are the experimental data the interpretation of this data into models is only convincing to the extent that it makes logical sense to the individual examining it since both space and common sense prohibits a continuous reiteration of this statement throughout the book be prepared to encounter some models and hypotheses which are based on sound experimental evidence as well as some which have no experimental basis at all in neither case are they facts but in either case they represent ideas which can be subjected to further experimental tests if the book helps to sharpen this critical evaluation of both ideas and the experimental test of the hypotheses one of its major purposes has been fulfilled

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interacting macromolecules the theory and practice of their electrophoresis ultracentrifugation and chromatography reviews advances in theory and practice concerning the electrophoresis ultracentrifugation and chromatography of interacting macromolecules the principles of mass transport of non interacting systems are discussed along with the weak electrolyte moving boundary theory and analytical solution of approximate transport equations for certain types of interactions computer computations on ligand mediated association dissociation reactions are also presented this book is comprised of six chapters and begins with a survey of the principles of electrophoresis and ultracentrifugation of non reacting systems before proceeding with a detailed treatment of the mass transport of reversibly reacting macromolecules a conservation equation is derived for a solution containing a single macromolecular ion the following chapters explore the weak electrolyte moving boundary theory the analytical solution of approximate conservation equations and numerical solution of exact conservation equations the formulation of the numerical computation for ligand mediated association dissociation reactions is described together with a code for sedimentation calculations the final chapter summarizes the procedures and precautions required to assure accurate interpretation of sedimentation and electrophoretic patterns in terms of the thermodynamic and molecular parameters characterizing the reactions exhibited by biological macromolecules the more common analytical applications of ultracentrifugation electrophoresis and chromatography are also outlined this monograph is

intended for molecular biologists and graduate students

the second edition of the macromolecular chemistry broadens into two areas biomacromolecules volume 1 and polymers volume 2 biomacromolecules covers carbohydrates lipids proteins nucleic acids their classifications and properties the first chapter looks at the structural formulas and cyclic forms of monosaccharides as well as their synthesis and breakdown cyclization enolization isomerization tautomerization mutarotation and epimerization are all briefly described examples of disaccharides and polysaccharides are also presented the second chapter covers triglycerides steroids vitamins and their constituents the third chapter examines the primary structure of proteins including amino acid properties peptide bond formation and peptide synthesis it also addresses secondary tertiary and quaternary structures the book concludes with a chapter on nucleic acids which covers the chemistry of nucleosides and oligonucleotides as well as topics such as genetic code dna secret code polymerase chain reaction and dna fingerprinting

all life is based on big molecules scientifically called macromolecules humans animals and plants cease to exist without these structural reserve and transport molecules no life can be propagated without macromolecular dna and rna without macromolecules we would only dine on water sugars fats vitamins and salts but had to relinquish meat eggs cereals vegetables and fruits we would not live in houses since wood and many stones consist of macromolecules without macromolecules no clothes since all fibers are made from macromolecules no present day car could run all tires are based on macromolecules without macromolecules no photographic films no electronics if macromolecules are so important then why is commonly so little known about their roles and why are they so little mentioned in school if at all as often in human history tradition is important and science makes no exception chemistry was established as the chemistry of low molecular weight compounds since these were most easy to investigate characterize and convert a beautiful tower of thought was erected by the chemical sciences long before the idea of giant molecules macromolecules took hold there was no space for newcomers in this tower even today one can learn about chemistry without hearing a word about macromolecules

integrating coverage of polymers and biological macromolecules into a single text physical chemistry of macromolecules is carefully structured to provide a clear and consistent resource

for beginners and professionals alike the basic knowledge of both biophysical and physical polymer chemistry is covered along with important terms basic structural properties and relationships this book includes end of chapter problems and references and also enables users to improve basic knowledge of biophysical chemistry and physical polymer chemistry explores fully the principles of macromolecular chemistry methods for determining molecular weight and configuration of molecules the structure of macromolecules and their separations

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