

Interfacial Science An Introduction

Knowledge of the basic interactions that take place between geological materials and different substances is the first step in understanding the effects of adsorption and other interfacial processes on the quality of rocks and soils, and on driving these processes towards a beneficial or neutral result. Interfacial Chemistry of Rocks and Soils examines the different processes at solid and liquid interfaces of soil and rock, presenting a complete analysis that emphasizes the importance of chemical species on these interactions. Summarizing the results and knowledge of the authors' research in this field over several decades, this volume: Explores the individual components of the studied systems: the solid, the solution, and the interface Discusses the characteristics and thermodynamics of the interface Illustrates the kinetic aspects of interfacial reactions Examines interfacial processes in a montmorillonite model system Demonstrates transformations initiated by interfacial processes Studies interfacial processes of real rock and soil solution systems Outlines avenues of treatment that may solve geological, soil science, and environmental problems Profiles the most important analytical methods in the study of interfacial processes Previous books in this area typically focus on selected aspects of the subject, such as the properties of the solid phase, or the interactions of selected substances with soil/rock. This book comprehensively treats the soil-liquid-interface system. Drawn chiefly from the authors' years of research at the Isotope Laboratory in the Department of Colloid and Environmental Chemistry at the University of Debrecen in Hungary, this book discusses chemical reactions on the surfaces/interfaces of soils and rocks; examines the role of these processes in environmental, colloid and geochemistry; and explores the effects on agricultural, environmental and industrial applications.

Poly mer Interface and Adhesion provides the critical basis for further advancement in this field. Combining the principles of interfacial science, rheology, stress analysis, and fracture mechanics, the book teaches a new approach to the analysis of long standing problems such as: how is the interface formed; what are its physical and mechanical properties; and how does the interface modify the stress field and fracture strength of the material. The book offers many outstanding features, including extensive listings of pertinent references, exhaustive tabulations of the interfacial properties of polymers, critical reviews of the many conflicting theories, and complete discussions of coupling agents, adhesion promotion, and surface modifications. Emphasis is placed on physical concepts and mechanisms, using clear, understandable

mathematics. Polymer Interface and Adhesion promotes a more thorough understanding of the physical, mechanical, and adhesive properties of multiphase, polymer systems. Polymer scientists and engineers, surface chemists, materials scientists, rheologists, as well as chemical and mechanical engineers interested in the research, development or industrial applications of polymers, plastics, fibers, coatings, adhesives, and composites need this important new source book.

With the rapid development of nanotechnology, the surface-to-volume ratio of objects of interest continues to increase.

As such, so does the importance of our ability to tailor interfacial properties. Written by bestselling author and internationally renowned researcher K.S. Birdi, Introduction to Electrical Interfacial Phenomena offers comprehensive 'The book neatly illuminates a forgotten history of female chemists — and this is not an overstatement. It contains a multitude of names, events and socio-economic interactions in the pursuit of women's education and professional emancipation that are guaranteed to contain stories that readers will not have heard before ... It is easily a dip-in and dip-out type of read, allowing simple navigation to specific areas of Britain, disciplines and professions ... Besides highlighting the women who fought against an inherently male-dominated system and celebrating their supporters, this book also examines the events and the history surrounding their lives and endeavours. It pays particular note to the nations of the British Isles and gives equal contribution to those lost in history as to those names we are all so familiar with. A fantastic resource that has been excellently researched, I am sure it will remain an ageless tribute and reference work.' Education in Chemistry Historically, British chemistry has been perceived as a solely male endeavour. However, this perception is untrue: the allure of chemistry has attracted British women for centuries past. In this new book, the authors trace the story of women's fascination with chemistry back to the amateur women chemists of the late 1500s. From the 1880s, pioneering academic girls' schools provided the knowledge base and enthusiasm to enable their graduates to enter chemistry degree programs at university. The ensuing stream of women chemistry graduates made interesting and significant contributions to their fields, yet they have been absent from the historical record. In addition to the broad picture, the authors focus upon the life and contributions of some of the individual women chemists who were determined to survive and flourish in their chosen field. From secondary school to university to industry, some of the women chemists expressed their sentiments and enthusiasm in chemistry verse. Examples of their poetic efforts are sprinkled throughout to give a unifying theme from grade school to university and industrial employment. This book provides a well-researched glimpse into the forgotten world of British women in chemistry up to the 1930s and 1940s.

Chemistry of Functional Materials Surfaces and Interfaces: Fundamentals and Applications gives a descriptive account of interfacial phenomena step-by-step, from simple to complex, to provide readers with a strong foundation of knowledge in interfacial materials chemistry. Many case studies are provided to give real-world examples of problems and their solutions, allowing readers to make the connection between fundamental understanding and applications. Emerging applications in nanomaterials and nanotechnology are also discussed. Throughout the book, the author explains the common interface and surface equations, models, methods, and applications in the creation of functional materials. The goal of Chemistry of Functional Materials Surfaces and Interfaces is to provide readers with the basic understanding of the common tools of surface and interface chemistry for application in materials science and nanotechnology. This book is suitable for researchers and practitioners in the disciplines of materials science and engineering and surface and interface chemistry. Includes numerous real-world examples and case studies throughout Addresses emerging applications of interfacial materials chemistry in nanomaterials and nanotechnology Provides the foundational concepts

of surface and interfacial science with models, equation, and methods

Colloid and Surface Chemistry is a subject of immense importance and implications both to our everyday life and numerous industrial sectors, ranging from coatings and materials to medicine and biotechnology. How do detergents really clean? (Why can't we just use water?) Why is milk "milky"? Why do we use eggs so often for making sauces? Can we deliver drugs in better and controlled ways? Coating industries wish to manufacture improved coatings e.g. for providing corrosion resistance, which are also environmentally friendly i.e. less based on organic solvents and if possible exclusively on water. Food companies want to develop healthy, tasty but also long-lasting food products which appeal to the environmental authorities and the consumer. Detergent and enzyme companies are working to develop improved formulations which clean more persistent stains, at lower temperatures and amounts, to the benefit of both the environment and our pocket. Cosmetics is also big business! Creams, lotions and other personal care products are really just complex emulsions. All of the above can be explained by the principles and methods of colloid and surface chemistry. A course on this topic is truly valuable to chemists, chemical engineers, biologists, material and food scientists and many more.

As the first of its kind, this book provides a valuable introduction for scientists and engineers interested in liquid/fluid interfaces and disperse systems to the rapidly developing area of adsorption dynamics. It is the first extensive review available on the subject of dynamics of adsorption and gives a general summary of the current state of adsorption kinetics theory and experiments. Current progress in recently designed set-ups and improved and generalised known methods for studying interfacial relaxations is reviewed. In addition, the role of the electric charge of surfactants in the adsorption process is discussed in terms of a non-equilibrium distribution of adsorbing ions in the diffuse layer. Present theories of the effect of dynamic adsorption layers on mobile surfaces, such as moving drops and bubbles, based on both diffusion and kinetic controlled adsorption models are described and efficient approximate analytical methods to solve the mathematical problem of coupling surfactant transport and hydrodynamics are introduced. The role of a dynamic adsorption layer in bubble rising, film drainage and film stabilisation and in complex processes such as flotation and microflotation is discussed. Containing more than 1100 references, the book is essential reading for industrial scientists and graduate and post-graduate students in physical, surface and colloid chemistry, physico-chemical hydrodynamics, water purification and mineral processing.

Interfacial Science: An Introduction is an accessible text introducing readers to the chemistry of interfaces, a subject of increasing relevance and popularity due to the emergence of nanoscience.

Despite factoring in countless natural, biological, and industrial processes, fixed attention on the singular attributes and behavior of fluids near or at interfaces has not received enough attention in the surface science literature. Liquid Interfacial Systems assembles and analyzes concepts and findings as an inclusive summation of fluid-fluid interfacial phenomena. This book covers excitation, stabilization, and suppression of instability at liquid interfaces. From the influential original research and scholarship of leaders in the discipline comes a volume to impart and explain definitions, scales, governing equations, and boundary conditions used in liquid interfacial system research.

Material-Tissue Interfacial Phenomena: Contributions from Dental and Craniofacial Reconstructions explores the material/tissue interfacial phenomena using dental and craniofacial reconstructions as a model system. As the mouth is a particularly caustic environment, the synthetic and/or bio-enabled materials used to repair damaged tissues and restore form, function, and esthetics to oral structures must resist a variety of physical, chemical, and mechanical challenges. These challenges are magnified at the interface between dissimilar structures such as the tooth/material interface. Interfacial reactions at the atomic, molecular, and nano-scales initiate the failure of materials used to repair, restore, and reconstruct dental and craniofacial tissues. Understanding the phenomena that lead to failure at the interface between dissimilar structures, such as synthetic materials and biologic tissues, is confounded by a variety of factors that are thoroughly discussed in this comprehensive book. Provides a specific focus on the oral environment Combines clinical views and basic science into a useful reference book Presents comprehensive coverage of material-interfacial phenomena within the oral environment

The book also treats the surface properties of apolar and polar molecules, polymers, particles and cells, as well as their mutual interaction energies, when immersed in water, under the influence of the three prevailing non-covalent forces, i.e., Lewis acid-base (AB), Lifshitz-van der Waals (LW) and electrical double layer (EL) interactions. The polar AB interactions, be they attractive or repulsive, typically represent up to 90% of the total interaction energies occurring in water. Thus the addition of AB energies to the LW + EL energies of the classical DLVO theory of energy vs. distance analysis makes this powerful tool (the Extended DLVO theory) applicable to the quantitative study of the stability of particle suspensions in water.-

Colloidal systems are important across a range of industries, such as the food, pharmaceutical, agrochemical, cosmetics, polymer, paint and oil industries, and form the basis of a wide range of products (eg cosmetics & toiletries, processed foodstuffs and photographic film). A detailed understanding of their formation, control and application is required in those industries, yet many new graduate or postgraduate chemists or chemical engineers have little or no direct experience of colloids. Based on lectures given at the highly successful Bristol Colloid Centre Spring School, Colloid Science: Principles, Methods and Applications provides a thorough introduction to colloid science for industrial chemists, technologists and engineers. Lectures are collated and presented in a coherent and logical text on practical colloid science.

An Introduction to Green Nanotechnology, Volume 28, provides students, scientists and chemical engineers with an overview of several types of nanostructures, discusses the synthesis and characterization of nanostructures, and provides applications of nanotechnology in daily life. The book offers a foundation to green nanotechnology by explaining why green nanotechnology is important. Covers biological sources in green nanotechnology, antioxidants, green nanostructures, mechanism, synthesis and characterization. The book ends with an evaluation of the risks of nanotechnology in human life and future perspectives. Introduces novel sources of plants having a high potential to be used as bio media to synthesize nanostructures Provides phytochemical properties and antioxidant potential, and their effects on stability, morphology and size of green nanostructures Includes a medicinal and technological comparison of green synthesized nanostructures to nano-products from non-green

methods Uses accessible language, avoiding complex concepts of mathematics, biology and chemistry

Colloidal Foundations of Nanoscience, Second Edition explores the theory and concepts of colloid chemistry and its applications to nanoscience and nanotechnology. The book provides the essential conceptual and methodological tools to approach nano-research issues. The authors' expertise in colloid science will contribute to the understanding of basic issues involved in research. Each chapter covers a classical subject of colloid science in simple and straightforward terms, addressing its relevance to nanoscience before introducing case studies. Sections cover colloids rheology, electrokinetics, nanoparticle tracking analysis (NTA), bio-layer interferometry, and the treatment of inter-particle interactions and colloidal stability. Gathers, in a single volume, information currently scattered across various sources Provides a straightforward introduction on theoretical concepts and in-depth case studies to help readers understand molecular mechanisms and master advanced techniques Includes examples showing the applications of classical concepts to real-world cutting-edge research Edited and written by highly respected quality scientists

An Introduction to Materials Engineering and Science for Chemical and Materials Engineers provides a solid background in materials engineering and science for chemical and materials engineering students. This book: Organizes topics on two levels; by engineering subject area and by materials class. Incorporates instructional objectives, active-learning principles, design-oriented problems, and web-based information and visualization to provide a unique educational experience for the student. Provides a foundation for understanding the structure and properties of materials such as ceramics/glass, polymers, composites, bio-materials, as well as metals and alloys. Takes an integrated approach to the subject, rather than a "metals first" approach.

An Introduction to Chemical Metallurgy, Second Edition introduces the reader to chemical metallurgy, including its fundamental principles and some of their applications. References in the text to a date and the author of some law or principle of physical chemistry are given for the sake of historical significance. This book is comprised of eight chapters and opens with an overview of thermodynamics, with particular emphasis on the first law of thermodynamics; the expansion of a gas; thermodynamically reversible changes; applications of thermochemistry in metallurgy; and experimental techniques in calorimetry. The following chapters focus on entropy, free energy, and chemical equilibrium; solutions and reaction kinetics; extraction and refining of metals, including refining by preferential oxidation; and corrosion and electrodeposition. Electrochemistry and interfacial phenomena are also explored, along with surface energy and surface tension, electrolytes and electrolysis, and reduction and oxidation potentials. This monograph is written primarily for chemists and metallurgists as well as students embarking on courses in chemical metallurgy.

The textbook seeks to bring readers with no prior knowledge or experience in interfacial phenomena, colloid science or nanoscience to the point where they can comfortably enter the current scientific and technical literature in the area. Designed as a pedagogical tool, this book recognizes the cross-disciplinary nature of the subject. To facilitate learning, the topics are developed from the beginning with ample cross-referencing. The understanding of concepts is enhanced by clear descriptions of experiments and provisions of figures and illustrations.

This edition has been greatly enlarged and updated to provide both scientists and engineers with a clear and comprehensive understanding of composite materials. In describing both theoretical and practical aspects of their production, properties and usage, the book crosses the borders of many disciplines. Topics covered include: fibres, matrices, laminates and interfaces; elastic deformation, stress and strain, strength, fatigue crack propagation and creep resistance; toughness and thermal properties; fatigue and deterioration under environmental conditions; fabrication and applications. Coverage has been increased to include polymeric, metallic and ceramic matrices and reinforcement in the form of long fibres, short fibres and particles. Designed primarily as a teaching text for final-year undergraduates in materials science and engineering, this book will also interest undergraduates and postgraduates in chemistry, physics, and mechanical engineering. In addition, it will be an excellent source book for academic and technological researchers on materials.

This text probes topics and reviews progress in interfacial electrochemistry. It supplies chapter abstracts to give readers a concise overview of individual subjects and there are more than 1500 drawings, photographs, micrographs, tables and equations. The 118 contributors are international scholars who present theory, experimentation and applications.

This is the first book on interfacial rheology. It aims to describe both its history as well as the current, most frequently used experimental techniques for studying dilational and shear rheology of layers at liquid/gas and liquid/liquid interfaces. The book opens with a chapter on the fundamentals of interfacial rheology. All (16) contributions include the theoretical basis for the presented methodologies, and experimental examples are given.

"Fundamentals of Interfacial Engineering" provides chemical, electronic, mechanical, and biomedical engineers with a coherent, integrated introduction to the fundamental concepts that relate to interfacial phenomena with applications to different processes and product situations. This book emphasizes the importance of intermolecular forces in holding materials together within a bulk phase or across an interface. It outlines the fundamental intermolecular interactions that occur in all interfacial systems. The work also describes the properties, processing, and behavior of fluid interfacial systems and treats solid surfaces and interfaces. In addition to being of direct industrial relevance, this book will provide engineering instructors with an excellent starting point for planning curriculum development in this important area.

Interfacial Science: An Introduction Oxford University Press

Volume IV (2005) covers preparation, characterization of colloids, stability and interaction between pairs of particles, and in concentrated systems, their rheology and dynamics. This volume contains two chapters written, or co-authored by J. Lyklema and edited contributions by A.P. Philipse, H.P. van Leeuwen, M. Minor, A. Vrij, R. Tuinier and T. van Vliet. The volume is logically followed by Vol V, but is equally valuable as a stand alone reference. * Combined with part V, this volume completes the prestigious series Fundamentals of Interface and Colloid Science * Together with volume V this book provides a general physical chemical background to colloid science * Covers all aspects of particle colloids

Interfacial phenomena driven by heat or mass transfer are widespread in science and various branches of engineering. Research in this area has become quite active in recent years, attributable in part, at least, to the entry of physicists and their sophisticated experimental techniques into the field. Until now, however, the field has lacked a readable account of the recent developments. Interfacial Phenomena and Convection remedies this problem by furnishing a self-contained monograph that examines a rich variety of phenomena in which interfaces play a crucial role. From a unified perspective that embraces physical chemistry, fluid mechanics, and applied mathematics, the authors study recent developments related to the Marangoni effect, including patterned convection and instabilities, oscillatory/wavy phenomena, and turbulent phenomena. They examine Bénard layers subjected to transverse and longitudinal thermal gradients and phenomena involving surface tension gradients as the driving forces, including falling films, drops, and liquid bridges. It is only in the past two or three decades that researchers have performed suitable, clear-cut experiments involving interfacial phenomena, and the stage is now set for a virtual explosion of the field. Interfacial Phenomena and Convection will bring you quickly up to date on the advances realized and prepare you to both use the

results and to make further advances.

Interfacial Separation of Particles is concerned with the processing and separation of fine solid particles in liquid solutions using interfacial technology. Interfacial separation has been finding wide application in many industrial fields, such as pigment and filler production, mineral processing, environmental protection, hydrometallurgy, bioengineering, food and beverage industry and chemical industry. This book describes all interfacial separation techniques and discusses the general and specific fundamentals of the techniques. The book intends to promote theoretical understanding and the more promising developments of interfacial separation technology whilst broadening the reader's background knowledge of industrial suspensions. * Is clearly written based on strong systematic science fundamentals * Provides comprehensive coverage on particle technology, mineral processing and water treatment * Includes practical examples from the different industrial fields

The goal of Interface Science and Composites is to facilitate the manufacture of technological materials with optimized properties on the basis of a comprehensive understanding of the molecular structure of interfaces and their resulting influence on composite materials processes. From the early development of composites of various natures, the optimization of the interface has been of major importance. While there are many reference books available on composites, few deal specifically with the science and mechanics of the interface of materials and composites. Further, many recent advances in composite interfaces are scattered across the literature and are here assembled in a readily accessible form, bringing together recent developments in the field, both from the materials science and mechanics perspective, in a single convenient volume. The central theme of the book is tailoring the interface science of composites to optimize the basic physical principles rather than on the use of materials and the mechanical performance and structural integrity of composites with enhanced strength/stiffness and fracture toughness (or specific fracture resistance). It also deals mainly with interfaces in advanced composites made from high-performance fibers, such as glass, carbon, aramid, and some inorganic fibers, and matrix materials encompassing polymers, carbon, metals/alloys, and ceramics. Includes chapter on the development of a nanolevel dispersion of graphene particles in a polymer matrix Focus on tailoring the interface science of composites to optimize the basic physical principles Covers mainly interfaces in advanced composites made from high performance fibers

Physics and Chemistry of Interfaces This general yet comprehensive introduction to the field focuses on the essential concepts rather than specific details, on intuitive understanding rather than learning facts. The text reflects the many facets of this discipline by linking fundamentals with applications. The theory behind important concepts is backed by scientific-engineering aspects, as well as by a wide range of high-end applications. Examples of applications from biotechnology to microelectronics are used to illustrate the basic concepts. New to this third edition are topics as second harmonic generation spectroscopy, surface diffusion, atomic layer deposition, superlubricity, and bioadhesion. At the same time, the discussions of liquid surfaces, the Marangoni effect, electric double layers, measurement of surface forces, wetting, and adsorption have been updated. The number and variety of exercises are increased and the references are updated.

From the Contents: Introduction Liquid Surfaces Thermodynamics of Interfaces Charged Interfaces and the Electric Double Layer Surface Forces Contact Angle Phenomena and Wetting Solid Surfaces Adsorption Surface Modification Friction, Lubrication, and Wear Surfactants, Micelles, Emulsions, and Foams Thin Films on Surfaces of Liquids Solutions to Exercises Analysis of Diffraction Patterns

New analytical methods have provided further insight into the structure, surface characteristics, and chemistries of increasingly small particles. However, current literature offers information on only a limited number of powders being investigated. Written by renowned scientists in the field, Powders and Fibers: Interfacial Science and Application

This English translation of a well-known Japanese book covers interfacial physicochemistry in materials science, especially for iron- and steelmaking processes. Interfacial Physical Chemistry of High-Temperature Melts bridges the gap between the basics and applications of physicochemistry. The book begins with an overview of the fundamentals of interfacial physical chemistry and discusses surface tension, describing the derivation of important equations to guide readers to a deep understanding of the phenomenon. The book then goes on to introduce interfacial properties of high-temperature melts, especially the Marangoni effect, and discusses applications to materials processing at high temperature focusing on recent research results by the author and the co-workers. This book is aimed at researchers, graduate students, and professionals in materials processing. Video clips of in-situ observation including experiments under microgravity condition and x-ray observation are available for download on the publisher's website to allow for a deeper understanding.

The whole field of surface science is covered in this work. Starting with a description of the structure and thermodynamics of clean surfaces, the book goes on to discuss kinetic theory of gases and molecular beam formation. This is followed by a large section on gas-surface interactions, and another major section on energetic particle-surface interactions. The final chapter provides the background to crystal nucleation and growth. The approach adopted is interdisciplinary and slanted towards the experimental side, with practical analytical techniques being used to illustrate general principles.

Electrochemistry is an old branch of physical chemistry. Due to the development of surface sensitive techniques, and a technological interest in fuel cells and batteries, it has recently undergone a rapid development. This textbook treats the field from a modern, atomistic point of view while integrating the older, macroscopic concepts. The increasing role of theory is reflected in the presentation of the basic ideas in a way that should appeal to experimentalists and theorists alike. Special care is taken to make the subject comprehensible to scientists from neighboring disciplines, especially from surface science. The book is suitable for an advanced course at the master or Ph.D. level, but should also be useful for practicing electrochemists, as well as to any scientist who wants to understand modern electrochemistry.

This book covers the essentials of Computational Science and gives tools and techniques to solve materials science problems using molecular dynamics (MD) and first-principles methods. The new edition expands upon the density functional theory (DFT) and how the original DFT has advanced to a more accurate level by GGA+U and hybrid-functional methods. It offers 14 new worked examples in the LAMMPS, Quantum Espresso, VASP and MedeA-VASP programs, including computation of stress-strain behavior of Si-CNT composite, mean-squared displacement (MSD) of ZrO₂-Y₂O₃, band structure and phonon spectra of silicon, and Mo-S battery system. It discusses methods once considered too expensive but that are now cost-effective. New examples also include various post-processed results using VESTA, VMD, VTST, and MedeA.

This fundamental book on interfacial phenomena forms the basis of application of interface and colloid science to various disperse systems. These include suspensions, emulsions, nano-dispersions, wetting, spreading, deposition and adhesion of particles to surfaces. These systems occur in most industrial applications, such as personal care and cosmetic formulations, pharmaceutical systems particularly for controlled and targeted delivery of drugs, agrochemical formulations and enhancement of their biological performance, paints and coatings as well as most food formulations. These applications are described in volume 2. The text is very valuable for formulation chemists, chemical engineers and technologies who are involved in such applications. In addition this fundamental text is also valuable for research scientists and Ph.D. students investigating various aspects of interface and colloid

science.

Understanding the characteristics of material contact and lubrication at tribological interfaces is of great importance to engineering researchers and machine designers. Traditionally, contact and lubrication are separately studied due to technical difficulties, although they often coexist in reality and they are actually on the same physical ground. Fast research advancements in recent years have enabled the development and application of unified models and numerical approaches to simulate contact and lubrication, merging their studies into the domain of Interfacial Mechanics. This book provides updated information based on recent research progresses in related areas, which includes new concepts, theories, methods, and results for contact and lubrication problems involving elastic or inelastic materials, homogeneous or inhomogeneous contacting bodies, using stochastic or deterministic models for dealing with rough surfaces. It also contains unified models and numerical methods for mixed lubrication studies, analyses of interfacial frictional and thermal behaviors, as well as theories for studying the effects of multiple fields on interfacial characteristics. The book intends to reflect the recent trends of research by focusing on numerical simulation and problem solving techniques for practical interfaces of engineered surfaces and materials. This book is written primarily for graduate and senior undergraduate students, engineers, and researchers in the fields of tribology, lubrication, surface engineering, materials science and engineering, and mechanical engineering.

Chemistry at Interfaces provides an introduction to the fundamental concepts in interfacial chemistry. It aims to provide students and research workers who have not had training in a school of surface chemistry with the means to set up and use interfacial techniques and to interpret measurements. For this reason, more emphasis is given to experimental details and to the associated pitfalls than most other books in the field. The book begins by considering some of the basic laws governing behavior in chemical systems and how these apply to some examples of interfacial processes. This is followed by a discussion of two specific properties of solid-liquid interfaces: the tendency to concentrate reactants and the ability to orientate molecules, thus increasing their reactivity. Separate chapters cover standards of cleanliness in interfacial work and methods to achieve them; techniques for the study of interfacial films; the kinetics of physical processes that can occur at an interface; and chemical and biological processes and reactions. The final chapter provides an overview of the wide-ranging applications of interfacial chemistry to practical problems.

Colloid and Interface Science in Pharmaceutical Research and Development describes the role of colloid and surface chemistry in the pharmaceutical sciences. It gives a detailed account of colloid theory, and explains physicochemical properties of the colloidal-pharmaceutical systems, and the methods for their measurement. The book starts with fundamentals in Part I, covering fundamental aspects of colloid and interface sciences as applied to pharmaceutical sciences and thus should be suitable for teaching. Parts II and III treat applications and measurements, and they explain the application of these properties and their influence and use for the development of new drugs. Provides a clear description of the fundamentals of colloid and interface science relevant to drug research and development Explains the physicochemical/colloidal basis of pharmaceutical science Lists modern experimental characterization techniques, provides analytical equations and explanations on analyzing the experimental data Describes the most advanced techniques, AFM (Atomic Force Microscopy), SFA (Surface Force Apparatus) in detail Since the publication of the first edition of Interfacial Phenomena, the interest in interfaces and surfactants has multiplied, along with their applications. Experimental and theoretical advances have provided scientists with greater insight into the structure, properties, and behavior of surfactant and colloid systems. Emphasizing equilibrium phenomena, flow, transport, and stability, Interfacial Phenomena: Equilibrium and Dynamic Effects, Second Edition presents a concise and current summary of the fundamental principles governing interfacial interactions. This new edition features updated and expanded topics in every chapter. It highlights key experimental techniques that have expanded the scope of our understanding, such as in mass transfer, microstructure determination in colloidal dispersions, and surfactant-polymer interactions. Interfacial Phenomena, Second Edition reflects the progress scientists have made in understanding the surface chemistry and interfacial dynamics of colloid and surfactant systems. The book also illustrates the growing applicability of these systems in a variety of fields including pharmaceuticals, cosmetics, detergents, paints, agricultural chemicals, and foods.

Offers an introduction to the topics in interfacial phenomena, colloid science or nanoscience. Designed as a pedagogical tool, this book recognizes the cross-disciplinary nature of the subject. It features descriptions of experiments and contains figures and illustrations that enhance the understanding of concepts.

The common perception is that nanoscience is something entirely new, that it sprung forth whole and fully formed like some mythological deity. But the truth is that like all things scientific, nanoscience is the natural result of the long evolution of scientific inquiry. Following a historical trail back to the middle of the 19th century, nanoscience is the inborn property of colloid and interface science. What's important today is for us to recognize that nanoparticles are small colloidal objects. It should also be appreciated that over the past decades, a number of novel nanostructures have been developed, but whatever we call them, we cannot forget that their properties and behavior are still in the realm of colloid and interface science. However one views it, the interest and funding in nano-science is a tremendous opportunity to advance critical research in colloid chemistry. Nanoscience: Colloidal and Interfacial Aspects brings together a prominent roster of 42 leading investigators and their teams, who detail the wide range of theoretical and experimental knowledge that can be successfully applied for investigating nanosystems, many of which are actually well-known colloidal systems. This international grouping of pioneering investigators from academia and industry use these pages to provide researchers of today and tomorrow with a full examination of nano-disperse colloids, homogeneous and heterogeneous nano-structured materials (and their properties), and self-organization at the nano-scale. This cutting-edge reference provides information on investigations into non-linear electrokinetic phenomena in nano-sized dispersions and nano-sized biological systems. It discusses application aspects of technological processes in great detail, providing scientists and engineers across all fields with authoritative commentary on colloid and interface science operating at the nanoscale. Nano-Science: Colloidal and Interfacial Aspects provides an authoritative resource for those wanting to familiarize themselves with current progress as well as for those looking to make their own impact on the development of new technologies and practical applications in fields as diverse as medicine, materials, and environmental science to name but a few. Whether you call the technology nano or colloids, the field continues to be ripe with opportunity.

Problems after each chapter.

The shape of drops and bubbles is the centre of interest for many interfacial scientists. This book describes the most recent accomplishments to make use of drops and bubbles in fundamental research and application. After a general introduction into the

mechanics of liquid menisci, chapters are dedicated to methods based on drops or bubbles. The chapters about the three main drop experiments provide the theoretical basis, a description of experimental set-ups, specific advantages and disadvantages, correction and calibration problems, experimental examples and their interpretation: pendent and sessile drop, drop volume, and spinning drop technique. The chapter about capillary pressure methods summarises different techniques and gives examples of applications, for instance measurements under microgravity. The maximum bubble pressure technique as a particular capillary pressure method is described, with emphasis on the most recent developments which made this technique applicable to extremely short adsorption times, down to the range of milliseconds and less. Problems connected with aerodynamics and hydrodynamics are discussed and used to show the limits of this widely used standard method. The oscillating bubble technique provides information not available by other techniques, for example about the dilational rheology of adsorption layers and relaxation processes at the interface. The description of rising bubbles in surfactant solutions will contain the hydrodynamic basis as well as the theoretical description of the effect of interfacial layers on the movement of bubbles. Besides the theoretical basis experimental data, such as water purification, flotation processes etc. and the relevance for practical applications will be presented. The chapter about lung alveols demonstrates how important bubbles built by biological membranes are in everyday life. The relevance for medicine and biology as well as model studies is discussed. An important example for the application of drops is metallurgy, where the surface tension of metals and alloys is an important parameter for many applications. The chapters on drop shape analysis by using fibre technique and on force measurements between emulsion droplets are of much practical relevance. Lists of references and symbols are given separately at the end of each chapter while a common subject index is given at the end of the book.

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