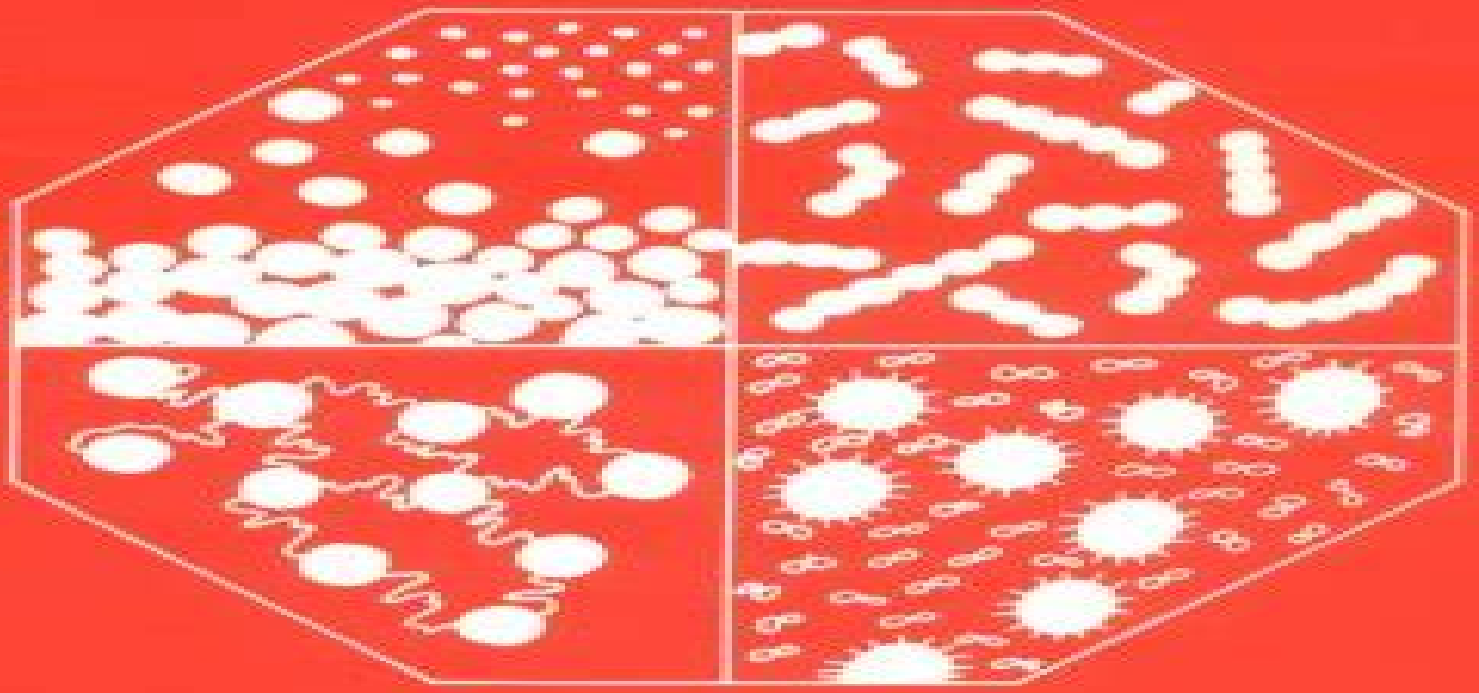
SOLID/LIQUID DISPERSIONS



Edited by Th. F. TADROS

Solid Liquid Dispersions

Tharwat F. Tadros

Solid Liquid Dispersions:

Solid-Liquid Dispersions T. F. Tadros,1987-02-11 Solid liquid dispersions also known as suspensions are widely used in industry Both aqueous and non aqueous suspensions are used in paints dyestuffs inks cosmetics detergents and pharmaceuticals More recently non aqueous dispersions of magnetic oxides have attracted considerable attention as a result of their applications in the electronics industry FROM THE PREFACE Solid liquid dispersions both of the aqueous and nonaqueous type find applications in many industrial preparations of which the following may be worth mentioning paints dye stuffs pigments paper coatings printing inks cosmetics ceramics pharmaceuticals and pesticides More recently nonaqueous dispersions of magnetic oxides have attracted considerable attention because of their applications in the electronic industry The control of the properties of such systems is crucial both in their preparation their long term stability and in their subsequent application Some of the parameters which control such properties are particle size and shape distribution interparticle interaction forces and volume fraction of the dispersed phase Understanding the basic principles involved in the preparation of solid liquid dispersions and control of the interparticle interacting forces is therefore crucial both from a fundamental and applied point of view Owing to the widespread use of solid liquid dispersions in many industrial applications a residential school was held at Bristol University during 1986 to fulfil some of the above requirements The scientific content of the course was organized by he Editor and the residential school was sponsored by the Royal Society of Chemistry of Great Britain This residential school was held to lay the basis of understanding of the colloid and interface science phenomena involved in the preparation of solid liquid dispersions their stabilization and destabilization and control of their bulk properties The lecture contents were planned to cover a wide range of topics and these form the basis of the present book which would be useful to graduate research and industrial chemists The book starts with an Introductory Chapter giving an outline of the contents of the book and the various themes that are covered Chapter 2 deals with the preparation of solid liquid dispersions with some emphais on the stabilization of such dispersions Both aqueous and nonaqueous dispersions are discussed and the two main procedures used namely condensation and dispersion methods are described This is followed by two chapters 3 and 4 on the structure of the solid liquid interface and the electrical double layer and stability of dispersions in which double layer repulsion and van der Waals attraction are the main contributions A section is also devoted in Chapter 4 on the kinetic aspects of coagulation and the expermimental methods used for determination of stability Chapters 5 and 6 deal with the adsorption of surfactants and macromolecules which are key factors in understanding how dispersions can be stabilized or flocculated by such molecules With polymers particular attention was given to the conformation of the molecule at the solid liquid interface The stability of solid liquid dispersions in the presence of polymers usually referred to as steric stabilization is described in Chapter 7 This is then followed by a chapter on flocculation by polymers and polyelectrolytes Chapter 8 The properties of concentrated dispersions in particular their

structure are given in Chapter 9 in which an attempt is also made to relate the microscopic to the macroscopic properties Chapter 10 deals with the rheology of colloid dispersions and the experimental techniques used for measurement of the viscoelastic properties The following chapter 11 deals with settling of suspensions and prevention of formation of dilatant sediments The theories of settling of dilute and concentrated suspensions are described and this is followed by the various procedures used for prevention of formation of dilatant sediments Chapter 12 deals with a specific topic namely the application of spectroscopic pKa probes for the determination of interfacial electrostatic potential The last Chapter 13 deals with the practical methods that may be applied for assessment of the properties of suspension Thus the book which has been produced as a result of the residual school on solid liquid dispersions is by no means a comprehensive text on the subject The topics have been carefully chosen to cover the basic principles involved in the preparation of solid liquid dispersions and the control of their properties The book should therefore provide a useful text for readers involved with solid liquid dispersions and their applications Several useful references are given which should be consulted for more detailed information would like to thank all the contributors for their care and cooperation in preparing the various chapters which made my editing job fairly easy I would like to thank the Royal Society of Chemistry in particular Miss Lorraine Hart for organizing ghe adminstrative side of the Course and her help during the residential school I would also like to thank Bristol University for hosting the residential school and Mrs Jean Proctor Bristol University and Mrs Irene Gallacher ICI for their help in the organization of the residential school at Bristol Last but not least I would like to thank my wife and children for coping with me during several weekends to write my contributions and editing the text From the Reviews Each chapter is written by a well known authority in the field and the exposition of the subject matter is particularly clear It is a pleasure to see a book so well written and produced and I am sure that it will be an invaluable addition to the reading lists for graduate research and industral chemists P A Sewell CHEMISTRY IN BRITAIN **Solid - Liquid Dispersions** Bohuslav Dobias,Xueping Qiu,Wolfgang von Rybinski,1999-03-04 Reviews a range of fundamental concepts recent developments and practical applications in dispersion theory along with relevant insights from colloidal and interfacial science The text contains new work on the stabilization of solid liquid dispersions It focuses on topics as varied as electrostatics hydrodynamics and rheology **Characterization of Liquids, Dispersions, Emulsions, and Porous Materials Using Ultrasound** Andrei S. Dukhin,Philip J. Goetz,2017-08-08 Characterization of Liquids Dispersions Emulsions and Porous Materials Using Ultrasound Third Edition presents a scientific background for novel methods of characterizing homogeneous and heterogeneous liquids dispersions emulsions and gels as well as porous materials Homogeneous liquids are characterized in rheological terms whereas particle size distribution and zeta potential are parameters of heterogeneous liquids For porous materials porosity pore size and zeta potential are output characteristics These methods are based on ultrasound which opens an opportunity for simplifying the sample preparation by eliminating dilution This in turn makes measurements faster easier precise suitable

for accurate quality control PAT and formulation of complex systems This book provides theoretical background of acoustics rheology colloid science electrochemistry and other relevant scientific fields describing principles of existing instrumentation and in particular commercially available instruments Finally the book features an extensive list of existing applications Presents a theoretical multi disciplinary background of several new ultrasound analytical techniques in one place Validates the theoretical basis of several new analytical techniques Compares the efficiency and applications of various ultrasound techniques Lists many ultrasound applications in colloid chemistry Contains an extensive bibliography on this multidisciplinary topic *Basic Principles of Dispersions* Tharwat F. Tadros,2017-12-04 Volume 2 of the Handbook of Colloid and Interface Science is a survey into the theory of dispersions in a variety of fields as well as characterization by rheology It is an ideal reference work for research scientists universities and industry practitioners looking for a complete understanding of how colloids and interfaces behave in the areas of materials science chemical engineering and colloidal science Handbook of Surface and Colloid Chemistry K. S. Birdi,2008-11-20 The third edition of this besteller covers the latest advancements in this rapidly growing field Focusing on analyses and critical evaluation of the subject this new edition reviews the most up to date research available in the current literature International contributors offer their perspectives on various topics including micellar systems mi *Integrated Pharmaceutics* Antoine Al-Achi,Mali Ram Gupta,William Craig Stagner,2013-02-11 Focusing on the application of physical pharmacy drug design and drug regulations as they relate to produce effective dosage forms for drug delivery Integrated Pharmaceutics provides a comprehensive picture of pharmaceutical product design describing the science and art behind the concepts of dosage form development Combining physical pharmacy product design and regulatory affairs issues in a single book the authors address topics governing drug regulations of United States European and Japanese agencies and detail new regulatory guidelines including quality by design design space analysis and blend sample uniformity **Dispersion of Powders** Tharwat F. Tadros,2012-04-24 Teaching the fundamental knowledge required for successful dispersion of powders in a liquid this book covers a host of topics from recent advances to industrial applications In 15 chapters it supports formulation chemists in preparing a suspension in a more rational way by applying the principles of colloid and interface science while at the same time enabling the research scientist to discover new methods for preparing stable suspensions Essential reading for those working in the pharmaceutical cosmetic food paint ceramic and agricultural industries **Interfacial Separation of Particles** Shouci Lu,Robert J Pugh,Eric Forssberg,2005-01-25 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 An Introduction to Surfactants Tharwat F. Tadros,2014-04-01 Surfactants are surface active agents molecules that have a significant role in emulsions suspensions and foams They find widespread application in personal care cosmetics pharmaceuticals agrochemicals and the food industry The main objective of this graduate level textbook is to present an overview of the classification physical properties phase behavior their effects and applications of surfactants e g as emulsifiers foam stabilizer in nano and microemulsions and as wetting agents

Interfacial Phenomena and Colloid Stability Tharwat F. Tadros,2015-05-19 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 **The Preparation of Dispersions in Liquids** H.N. Stein,2020-07-24 This work details the preparation of dispersions in liquids It sets out to bridge the gap in information for the chemist who is not applications oriented and the chemical engineer who needs to solve problems in the field based on theoretical methods of dispersions of solids liquids and gases Insights are provided into many topics including the transportation and handling of finely divided soils or highly viscous liquids the reactions between reactants dissolved in immiscible phases the formation of porous materials and filtration *Solid-Liquid Separation* Ladislav Svarovsky,2000-10-31 Solid Liquid Separation includes important industrial processes used for recovery and processing of solids or purification of liquids Most of the process industries in which particulate slurries are handled use some form of solid liquid separation and yet the subject is not adequately covered in most higher education courses This book is designed to bring the readers up to date on the principles and industrial practices of solid liquid separation and washing technology Particular attention is given to hardware and to its evaluation application and selection Whilst not exclusively concerned with filtration and sedimentation these operations will be dealt with in depth Important variations in the available equipment will be discussed throughout the book with emphasis on basic engineering concepts equipment selection and evaluation solids washing methods of pre treatment filter aids and other practical aspects of mechanical separation This book is intended for engineers and scientists of graduate status who are engaged in design

production for research and development This book is designed to bring the readers up to date on the principles and industrial practices of solid liquid separation and washing technology Particular attention is given to hardware and to its evaluation application and selection Whilst not exclusively concerned with filtration and sedimentation these operations are dealt with in depth Important variations in the available equipment are discussed throughout the book with emphasis on basic engineering concepts equipment selection and evaluation solids washing methods of pre treatment filter aids and other practical aspects of mechanical separation This book is intended for engineers and scientists of graduate status who are engaged in design production for research and development Author is the top of his field and knows well all the latest advances in his subject area Fourth edition of a title which is respected and admired in the world of Chemical Engineering Updated and revised to match the developments in the industry **Formulation of Disperse Systems** Tharwat F. Tadros,2014-08-25 This book presents comprehensively the science and technology behind the formulation of disperse systems like emulsions suspensions foams and others Starting with a general introduction the book covers a broad range of topics like the role of different classes of surfactants stability of disperse systems formulation of different dispersions evaluation of formulations and many more Many examples are included too Written by the experienced author and editor Tharwart Tadros this book is indispensable for every scientist working in the field **Trends in Colloid and Interface Science XV** Petros G. Koutsoukos,2003-07-01 The 14th Conference of the European Colloid and Interface Society ECIS 2000 was held in September 2000 in Patras GREECE Researchers from the academia and the industrial sector met and presented research work divided in nine thematic sections molecular interactions in thin films polymer surfactant interactions structure and dynamics at interfaces biocolloids colloids in pharmaceutical and biological applications new trends in colloid and interface science techniques rheology self assembly of amphiphiles and measurements in concentrated suspensions Selected contributions from these thematic areas are presented in the present volume and show the up today achievements of the Colloid and Interface Science *Nanodispersions* Tharwat F. Tadros,2015-12-14 General introduction Definition of nanodispersions nanosuspensions nanoemulsions swollen micelles or microemulsions liposomes and vesicles and their size range General description of their colloid stability Main advantages of nanodispersions and their industrial applications Preparation of nanosuspensions by top up process Nucleation and growth and control of particle size distribution Factors determining the formation of narrow particle size distribution Role of surfactants and polymers Preparation of nano polymer colloids lattices by emulsion and dispersion polymerization Factors affects the stability of nanosuspensions Preparation of nanosuspensions by bottom down process Dispersion of preformed particles in liquids and the need of a wetting agent Break up of aggregates and agglomerates by application of high speed stirrers Reduction of particle size by application of intense energy microfluidization or bead milling Maintenance of the colloid stability of the resulting particles Reduction of Ostwald ripening Industrial applications of nanosuspensions Application in pharmacy to enhance bioavailability Application in

sunscreens for UV protection Application in paints and coatings Preparation of nanoemulsions by the use of high pressure homogenisers Principles of emulsion formation and the role of the emulsifier Selection of emulsifiers Methods of emulsification and prevention of coalescence during emulsification Origin of colloid stability of nanoemulsions Prevention of Ostwald ripening Low energy methods for nanoemulsion preparation The phase inversion composition method and the role of mixing the surfactant with oil and water The phase inversion temperature method for preparation of nanoemulsions Preparation of nanoemulsions by dilution of microemulsions Practical examples of nanoemulsions and their industrial application Nanoemulsions based on non ionic surfactants and the role of the hydrophilic lipophilic balance Effect of oil solubility on the stabilityof nanoemulsions Nanoemulsions based on polymeric surfactants Applications in pharmacy and cosmetics Swollen micelles or microemulsionsDefinition of microemulsions and their size range Thermodynamic definition of microemulstions Theories of microemulsion formation and stability Characterisation of microemulsions using scattering conductivity and NMR rechniques Formulation of microemulsions and their industrial applications Distinction between microemulsions and macroemulsions Formulation of oil water and water oil microemulsions Selection of emulsifiers for microemulsions Application of microemulsions in tertiary oil recovery Liposomes and vesicles Formation of multilamellar lipid layers liposomes by dispersion of lipids in water Formation of unilamellar vesicles by sonication of the liposomes Factors responsible for stabilisation of liposomes and vesicles Use of block copolymers to enhance the stability of vesicles Applications of liposomes and vesicles in pharmacy and cosmetics Mixing Process Technology Kishore Kar,Richard Cope,Juergen Lueske,2025-07-31 Industrial mixing processes often present multiple optimization challenges to producing desirable products The resulting processes must be cost effective first time right and frequently the designated most effective technology for the global manufacture of specific products Mixing Process Technology A Guide to Industrial Applications shares the authors extensive knowledge of mixing research and industrial practice It features 20 industrial mixing chapters that are purposely light on mixing fundamentals while heavy on practical mixing applications for practical process design and manufacturing This text serves as an applied guide to industrial mixing for practitioners who want brief explanations of mixing concepts with real life examples and software to help perform associated design calculations This book also Offers side by side discussion of mixing systems including impellers and rotor stators as offered by several major manufacturers Describes the authors innovative mixer designs to meet manufacturing needs Includes a chapter by a mixer manufacturing representative describing design sizing and expensing of industrial mixers Presents a chapter by a mixing equipment manufacturing leader that explains mechanical design considerations in clear terms Contains a chapter on emerging mixing technologies including mixing via resonant acoustics and controlled cavitation Discusses computational fluid dynamics in mixing with multiple practical examples by a contributing author from a leading pharmaceutical company Includes Excel based mixing worksheets throughout book examples and Excel based input output mixit io interface hosted on

the publisher s website This book is aimed at chemical and process engineers as well as students seeking to understand industrial mixing technology **Rheology of Particulate Dispersions and Composites** Rajinder Pal,2006-11-22 Rheology of Particulate Dispersions and Composites provides comprehensive coverage of fundamental principles and equations that govern the rheology for particulate dispersions and two phase solid composites The rheological properties of suspensions emulsions bubbly liquids foams and other dispersions appear alongside those of solid comp *Technological Applications of Dispersions* Robert B. McKay,2020-08-26 This comprehensive guide illustrates the effects of dispersions in applications the means necessary to achieve these effects with optical results and how to overcome or avoid the difficulties encounteredemphasizing the dispersions of solid particles in liquid or solid media Springer Handbook of Experimental Fluid Mechanics Cameron Tropea,Alexander L. Yarin,John F. Foss,2007-10-09 Accompanying DVD ROM contains all chapters of the Springer Handbook Page 3 of cover Suspension Concentrates Tharwat F. Tadros,2017-02-20 Suspension Concentrates is a survey into the theory of the formulation and stabilization of suspensions elaborating on the breaking of aggregates and agglomerates and the role of dispersing agents on flocculation and electrostatic and steric stabilization Practical analysis by rheology is discussed Suspension Concentrates is ideal for research scientists and Ph D students investigating chemistry chemical engineering and colloidal science

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