Solid-Liquid Dispersions

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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:
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