

Introduction To Soft Matter

Ian W. Hamley, John Wiley & Sons, Ltd, Chichester, 2000, 342 pp, £22.50 paperback, £65.00 hardback, ISBN 0-471-89952-6 paperback, ISBN 0-471-89951-8 hardback

The 'soft matter' of the title of this book is virtually synonymous with the 'soft solids and structured liquids', that are of growing interest to the chemical engineering community [1,2]. There has been a great deal of attention shown recently in the measurement, manipulation and manufacture of such materials and their microstructure, to the extent of a large Engineering and Physical Sciences Research Council (the UK-government science and engineering funding body) initiative in the area. Out of this initiative have come many practical benefits in the area of what has become known as 'colloid engineering'. This book is an excellent introduction to the necessary colloid chemistry/science that will be needed by those chemical engineers who want to become active in the colloid area.

The author of the book, Ian Hamley, leads a group in the Chemistry Department at Leeds University which is at the forefront of activity in the area of soft matter in general and polymers and surfactants in particular. He is especially interested in the way that these systems self-assemble, with the resulting materials being of great interest in the areas of drug delivery, encapsulation and thin films, etc. He has developed a wide range of state-of-the-art characterisation techniques such as small-angle X-ray and neutron scattering. He has already published a book on the physics of block copolymers (OUP, 1998) which covered one specific area of his interests. Although, he states that this new book was written primarily for undergraduates taking physical chemistry courses, in particular the final-year module on the 'Physical Chemistry of Condensed Matter' at Leeds, he also argues that any proper approach to the subject will, of necessity, be interdisciplinary, but that 'the subject is not considered in conventional textbooks on physics, physical chemistry or materials science, often being neglected entirely or covered in an inadequate manner'. He, therefore, offers his book as an effort to 'fill the gap', by 'providing an up-to-date introductory summary of the thermodynamics and dynamics of soft materials'.

For convenience soft materials are characterised in this book under the headings of polymers (Chapter 2); colloids (Chapter 3); amphiphiles, i.e. surfactants (Chapter 4) and liquid crystals (Chapter 5), but the author admits that there are often no great distinctions between these systems, for instance, between liquid crystals in detergent and polymer systems.

As to practical details, the book is very well illustrated; equations have been kept to a minimum, and questions and answers are provided at the end of each chapter. The writing is appropriate for the book's intended readership, for instance, he describes amphiphiles (the politically correct name for surfactants) as having a 'Jekyll and Hyde character. They are molecules with two sides to their nature. One

part likes a solvent (i.e. is soluble in it) and the other does not'.

The 19th century was the age of 'hard matter', i.e. iron and steel. The 20th century saw the development of softer materials such as polymers. The 21st century will be the century of a deepening interest in 'soft matter', whether it be in traditional products such as detergents, paints, plastics, personal care products, foods, clays, plastics and gels, or in the emerging areas of bio-materials. Writing introductory books in any area might appear simple, but as anyone who has tried it will know, it is in fact very difficult. Moreover, writing an introduction to soft matter is even more difficult, given the breadth of the subject and the potential readership. The author of this book has done well in his efforts in this matter.

The publisher's back-cover 'blurb' claims that 'Introduction to Soft Matter', is "the first introductory text presenting a comprehensive and unified coverage of a subject that spans the disciplines of chemistry, materials science and physics". After reading the book one is inclined to believe them, and hence to encourage chemical engineers to think about buying it if they want to move into this area.

References

- [1] H.A. Barnes, Delivering rheology to the consumer — the challenges facing process engineering science in the manufacture of liquid products, *Ingenia* 1 (2) (1999) 46–48.
- [2] H.A. Barnes, Soft solids — an important area of food research, *foodDIRECT*, The Newsletter of the Food Directorate of the BBSRC 2 (1995) 3–4.

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Handbook of Petrochemicals and Processes

G. Margaret Wells, Ashgate Publishing Ltd., 2nd Edition, 1999, 494 pp., £95.00, ISBN 0-566-08046-X

This book provides a compendium of petrochemical processes. The book is a revised version of an original 1991 publication. It concentrates on olefins and aromatics with some exceptions such as ammonia. For each product the main process alternatives are briefly explained. The following information is also given: key product properties, international classifications important for the legal framework for transportation, a summary of main uses for the product, a discussion of health and handling issues, and a list of major plants world-wide and major licensors.

While not as comprehensive as Shreve, I found it easier to get around. It also has a number of useful features such as lists of large facilities world-wide, licensors of technology, and main health and safety issues. Inevitably the ownership lists get out of date rather quickly — for example, ICI is

rather over represented. Another useful feature is the index of licensors. Key European addresses for transportation and health and safety are also given.

The process listings are comprehensive, if inevitably conservative. The author aims to include those processes due to be commercialised by the year 2000. The process descriptions concentrate on the most common while I found some recent developments not included. For example, the reactive distillation process for MTBE is not mentioned and the prospects for this product are overstated given recent developments in limiting its use as a fuel additive. Also the new

BP fluid bed process currently under construction for vinyl acetate only gets a passing reference as 'claimed by BP'. However, my sampling was by no means complete and lists of major processes are comprehensive and well explained.

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