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Book Reviews

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Book Reviews

ADHESION 6, edited by K. W. Allen. Applied Science Publishers, London and Englewood, N.J., 1982, 215 pp. (\$64.00).

The latest volume in this well-established series contains papers presented at the Nineteenth Annual Conference on Adhesion and Adhesives, held at City University, London, in April 1981. One of its strengths is the balance and diversity of the topics covered, as can be seen from the titles of the 14 chapters:

1. Adhesion in a Low-Gravity Environment (Padday).
2. Marine Animals and Adhesion (Young and Crisp).
3. On the Mechanics of Peeling (Lake and Stevenson).
4. Correlation of the Shear Strength of a Napkin-Ring Adhesive Joint with both Dynamic Elastic Stiffness and Torsional Wave Damaging (Curtis, Lloyd and Allen).
5. A Variational Approach to Sessile Drops (Shanahan).
6. Surface Analytical Techniques – A Review (Allen).
7. The Use of Modern Surface Techniques in Adhesion (Kinloch).
8. XPS Studies of Polymer Surface Modifications and Adhesion Mechanisms: Electrical Discharge Treatment of Low Density Polyethylene (Briggs).
9. The Application of Inelastic Electron Tunneling Spectroscopy to a Study of Adhesives (Oxley).
10. Measurement of Swelling Stresses by Optical Interferometry (Sargent and Ashbee).
11. Dispersion Based Contact Adhesives (Welch and Keating).
12. The Role of Water Diffusion in the Durability of Adhesive Joints (Comyn).
13. Some Applications of Structural Adhesives (Garnish).
14. The Fracture of Epoxy and Elastomer-Modified Epoxy Polymers (Bascom and Hunston).

The scope of the individual papers varies rather widely. There are

several fairly general reviews. Those by Padday and Allen are likely to be useful to the general reader, but could have been improved by including a more extensive bibliography. The contribution by Garnish, on the other hand, is quite superficial and seems out of place in a volume of this sort.

Some of the chapters describe new experimental techniques. Curtis and Allen give a very thorough discussion of the design of a new mechanical test apparatus, with some limited experimental results. Oxley describes the principles behind IETS, and examples of typical applications. Sargent and Ashbee discuss a novel and ingenious experimental method which is unfortunately limited to transparent adherends.

Many of the contributions to this volume are reviews of the authors' own work in a given subject area. In one or two cases, this could have been better indicated in the chapter title. Young and Crisp, for example, deal almost exclusively with their experiments on the behavior of the byssus pads of mussels. Welch and Keating discuss some aspects of the formulation of a commercial latex based adhesive system, but barely mention the fundamental principles which control its performance.

This reviewer particularly enjoyed the chapters by Briggs and by Bascom and Hunston. Both summarized the authors' work in considerable detail and also provided a good description of the theoretical background and the contributions of other workers in the field.

This volume contains a substantial amount of worthwhile and interesting material, but possible purchasers may question whether its fairly high price is justified, in view of the fact that most of its contents are available (in slightly different form, to be sure) in recent issues of this and other journals.

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SYNTHETIC RUBBERS: Their Chemistry and Technology. D. C. Blackley. Applied Science Publishers Ltd., London and New York, 1982. 372 pp. U.S. \$66.75

This is a well written and very readable book which provides a new entrant to the field with much of the basic information needed on the many types of synthetic rubber available. It covers in an even and reasonable way rubbers from the basic butadiene copolymers through functionalized molecules such as the carboxylated butadienes and more highly reactive components of fluid rubbers. An unusual feature in a book of this type is the inclusion of a chapter on plasticized poly(vinyl chloride), a substance not regularly treated in books on rubber chemistry.

The aim of the book is clearly stated in Dr. Blackley's preface together with the topics to be treated. However, I feel that the title itself is somewhat misleading insofar as technology is given equal weight with chemistry. That part of rubber technology which takes the polymer through to the finished product receives only cursory treatment and anyone expecting substantial sections on vulcanization chemistry and technology will be disappointed.

However, in spite of this bias in the book the subjects treated are very well covered and it is useful to find in one place so much detail on the manufacture of rubbery polymers, their properties and potential applications. For readers seeking this kind of information this is indeed a very worthwhile book although the U.S. Price of \$66.75 may well limit its purchase to libraries.

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COLLOIDS AND SURFACES IN REPROGRAPHIC TECHNOLOGY, Editors Michael Hair and Melvin D. Croucher, American Chemical Society, Washington, DC, 1982, 594 pp. \$58.95.

This collection is the 200th volume in the ACS Symposium Series. Like most of its predecessors, it has been well produced, carefully edited and seems to be an excellent value for the price. It contains 28 papers, from a symposium sponsored by the ACS Division of Colloid and Surface Chemistry, at the August, 1981, National Meeting.

The subject matter ranges widely, from lithography and conventional printing, through photography, xerography, ink jet printing and novel imaging processes. The focus throughout is on the contributions made by surface chemistry to an understanding of the fundamental mechanisms involved, and to the solution of crucial problems of a practical nature. Since most of the authors are associated with firms which have been in the forefront of these developments, there were the obvious problems involved in writing about matters of proprietary importance; for the most part, they have met the challenge in admirable fashion.

“Practical” workers in some of the older branches of printing might argue that they have achieved a high level of efficiency in spite of our still-incomplete understanding of the basic theory; nevertheless, many of the unresolved problems, such as those relating to the interactions between ink and paper, still pose a considerable scientific challenge. Some of the newer technologies, including xerography and ink jet printing, might still be in a fairly primitive state without the contributions of the surface chemist. An illustration is furnished by quoting from one of the papers in this volume:

“This application (magnetic ink jet printing) imposes a certain set of requirements such as: particle size $100 \pm 50 \text{ \AA}$, magnetic moment of 25 emu/g or 35%w Fe_3O_4 in colloidal dispersion, viscosity of 8–10 cps, non-toxic aqueous system, shelf life of a few years, freeze-thaw stability, fast drying (2 msec) . . .”

The contents of this book are organized into four sections: Photography (7 papers), Electrophotography (8 papers), Printing and Novel Imaging Technologies (4 papers), Ink-Paper Interactions and Ink Jet Printing (9 papers). Most of the papers include sufficient background material to orient readers who are not well acquainted

with the details of the processes involved. Several are fairly extensive reviews of relevant subjects, including surface effects in silver halide photography (Bird), electrophotography (Weigl), physics of non-aqueous colloids (Novotny) and ink-paper interactions in printing (Lyne and Aspler).

Because of the wide range it covers, this volume should contain something of value to almost anyone with a serious interest in surface chemistry. In fact, the subject matter involves many of the most difficult and challenging problems in the entire field. The book should be most useful to those who are, or intend to be, actively involved in reprographics, but this reviewer has no hesitation in recommending it to any surface chemist with a healthy curiosity about a branch of technology which affects our lives every day.

One serious criticism can be levelled at this volume. The index impressed me as being far less useful than it could have been; the appropriate words are there, but there was little evidence of analytical thinking about the structure of the subject matter. As a result, it is more difficult than it needs to be to follow references to a given topic through the volume.

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