

points evenly, but instead it clusters them to define sharp features of the plot and uses them sparsely when the line is flat. If too few points are requested, of course, important features of the graph will be lost. The user can experiment with different interpolations to get the best compromise.

The program works in two steps. The input graph is read in and receives some generic processing in pass 1. The user can then select different combinations of filters and interpretation functions to be applied before executing pass 2. After pass 2, a new display of the graph is presented so the effects of the functions can be evaluated. It is important to note that the enhanced plot produced here cannot be output to a file as an improved graph. There is a cursor with  $x$  and  $y$  numerical readout that can be moved around this graph. It can be used to evaluate features like peak tops or crossover points. Aside from that, the only purpose of the enhancing features is to improve the quality of the numerical data file produced by DataScan.

At first the manual was confusing. After we learned what the program was doing by running the examples supplied with it, the manual was much clearer. Computer documentation that does not make sense until after you know what it says is a common problem. In all, it took about 3 h to understand the program. DataScan runs reasonably fast and is easy to use. It makes clear and efficient use of the Macintosh pull-down menu scheme. In one test, DataScan reproduced the original data used to make a graph with about 2% error. Presumably such accuracy depends on the care used and the resolution chosen during the digitization process.

Finally, it should be noted that the problem of turning graphs back into numbers is not trivial. DataScan does a reasonable job of dealing with the uncertainties and complications of this process. Those who have a digitizer and a need to make such conversions will find DataScan a very useful tool.

Robert Megargle and Robert Wilkes, *Cleveland State University*

## Book Reviews

**Polymeric Reagents and Catalysts—ACS Symposium Series 308.** Edited by Warren T. Ford (Oklahoma State University). American Chemical Society: Washington, DC. 1968. viii + 295 pp. \$54.95. ISBN 0-8412-0972-3

This book brings to the attention of organic chemists the usefulness of polymer-supported reagents. This volume contains only invited authoritative reviews. An overview by Warren T. Ford describes the history of polymeric reagents, including an account of Merrifield's solid-phase peptide synthesis and a brief short course on basic polymer bound Wittig reagents and a review on site isolation organic synthesis in polystyrene networks. David E. Bergbreiter describes useful chemistry which has been accomplished with use of soluble macromolecular reagents. F. J. Waller reviews the chemistry of NAFION resins and other perfluorinated ion-exchange polymers (PFIEP). Polymeric photosensitizers is the subject of a chapter by Doug Neckers of Bowling Green State University. John Ekerdt discusses the role of substrate transport in catalyst activity; Philip Garrou the stability of polymer supported transition metal catalyst; and Richard Taylor polymer bound oxidizing agents. Gunter Wulff reviews the literature on molecular recognition by imprinting with templates. Lastly, A. Patchornik co-authors a treatise discussing the future role of polymeric reagents toward automation in organic synthesis. The volume also contains an adequate subject index. In general, this ACS symposium series volume is well done and should become an initial reference text for any organic chemist contemplating using a polymeric reagent or catalyst.

James R. Zeller, *Parke Davis Company*

**Rates of Phase Transformations.** By R. H. Doremus (Rennselaer Polytechnic Institute). Academic Press: Orlando, FL. 1985. x + 176 pp. \$29.00.

This book is intended as a graduate-level introductory text on the kinetics of phase transformations, with applications that could be of interest to materials scientists, chemical engineers, chemists, and physicists. The author has taken a broad point of view, emphasizing what is perceived to be phase-change behavior that is common to all materials. It thus seeks to present general principles rather than concentrate deeply on any particular type of application. There is a very brief introductory chapter on thermodynamics that does little more than define activities and activity coefficients. The second chapter is more thorough in its discussion of classical solutions to the diffusion equation with a Fickian diffusive flux in binary solutions, with particular emphasis on the solution to moving-boundary problems of importance in the study of crystallization and melting. There is also a brief description of interface and diffusion control and nucleation and growth, all in mathematical terms. The degree of detail and clarity of the presentation in this chapter is excellent. The author does a good job in explaining the physical implications of the formulas derived. There is a good set of homework problems at the end of the chapter, as well as bibliography separated into books and research articles. This practice is maintained throughout the remainder of the text, and it is a good way to get an introduction to the literature on specific applications of the material found in the chapter.

The third chapter deals with the thermodynamics of multicomponent systems, including surface energies. This is followed by a summary of

the values of surface energies of solid surfaces, together with the implications of the surface energy terms as to the shape and size of crystals and the segregation of chemical components to an interface. Chapter four presents both theoretical and experimental results on the formation of liquid droplets from the vapor phase. There is a similar chapter (Chapter 5) on nucleation from condensed phases, both liquid and solid. This last includes a very clear explanation of spinodal decomposition, with a minimum of mathematics, but with very nice illustrations. Phase separation of liquids and crystal growth from the vapor are treated in Chapters 6 and 7. Chapter 7 is one of the more detailed treatments in the text, and it makes excellent use of the material in previous chapters on the thermodynamics of interfaces and the kinetics of nucleation. It also introduces the reader to the role of surface diffusion in crystal and whisker growth. Chapter 8 on solidification I found to be a little weak because the author does not go into a great deal of detail on the solution of the heat conduction equation with the required phase change boundary conditions, but rather chose to underline the importance of heat transfer in solidification using more qualitative arguments. The chapter does contain good descriptions of spherulite and dendritic growth and excellent plates illustrating the growth of solid crystals from the melt. The chapter on the growth of crystals from solution (Chapter 9) discusses the role of transport in the solvent on the crystal growth process and uses sucrose as the example for the formation of molecular (non-ionic) crystals. The growth of ionic crystals is briefly discussed, as is the effect of particle size on growth rates. However, this chapter does not consider in detail the strong influence of size distributions and impurities on nucleation phenomena. It would also have been nice to see some mention on the use of surfactants to control crystal growth (a common industrial practice) and some treatment of the crystallization of polyelectrolytes (proteins for instance). The last two chapters (10 and 11) are pretty much qualitative in nature, and they cover the growth of grain boundaries and precipitation in metals. As is true of the rest of the text, this material is also well-illustrated with pictures and diagrams.

This book is really a pedagogical masterpiece. It manages to get explanations of the main physical phenomena across with a minimum of mathematical detail, but with the use of excellent illustrations, photographs, and tables. The rigorous mathematical physicist may be disappointed, but this would be the book I would recommend to anyone wishing an introduction to the general area of phase transitions. The text is beautifully written. The exposition is clear, and when coupled with the carefully chosen examples and illustrations, it makes for fast, efficient and yes, even pleasurable, reading of some conceptually very tough subject matter. Finally, it contains a good index and, as was mentioned above, a good bibliography at the end of each chapter. This is an excellent book to be used as a text, or for the general scientist wishing a good introduction to the area of the kinetics of phase transitions.

R. G. Carbonell, *North Carolina State University*

**Flow Injection Analysis: Principles and Applications.** By M. Valcárcel and M. D. Luque de Castro (University of Córdoba). John Wiley & Sons: New York. 1987. x + 400 pp. \$88.95. ISBN 0-85312-904-5

The popularity and utility of flow-injection analysis (FIA) is evidenced by the some 1600 publications on the technique in the past eleven years, nearly half appearing in the last two years. This monograph is a welcome English version of *Análisis por Inyección en Flujo*, published in 1984.

translated from Spanish by A. Losada, a former student of the authors, with editing by Professors S. J. Lyle and R. A. Chalmers. In his foreword, Professor H. A. Mottola describes this as an "updated and improved form" of the Spanish version, and the copyright pages imply a 1987 book. In practice, the literature is current to 1984, and the updating applies to the authors' publications (all but two of the sixteen references listed for 1985 and 1986 are from the authors' laboratory). In addition to the some 500 references listed in the chapters, there is a fair amount of original material introduced to illustrate fundamentals.

This treatise provides a comprehensive coverage of the FIA technique, with thirteen chapters on the features and foundations of FIA, the basic components, detection systems, the modes of implementation, gradient techniques, kinetic methods, two-phase modes, and applications in clinical chemistry and environmental analysis. An introductory tutorial chapter on automatic methods of analysis seems out of place but is informative.

The authors have considered all fundamental aspects of FIA, from theoretical foundations of the dispersion process, with good conceptual discussions, to implementation in its many forms. They provide a balanced and important critical discussion throughout, generally with a historical perspective, and make generous use of tables and figures. It would have been useful to the reader to have included the author index provided in the Spanish edition.

In spite of being somewhat dated, and the soon-to-appear second edition of Ruzicka and Hansen's book, this is a treatise every practitioner of FIA should have on his or her shelf.

Gary D. Christian, University of Washington

### Volumes of Proceedings

**Methods for Assessing the Effects of Mixtures of Chemicals.** Edited by Velimir B. Vouk, Gordon C. Butler, Arthur C. Upton, Dennis V. Parke, and Susan C. Asher. John Wiley & Sons: New York. 1987. xxxiii + 894 pp. \$179.95. ISBN 0471-91123-2

A "workshop" was held at the University of Surrey in 1983 on the effects of chemicals on the environment and was sponsored by the Scientific Committee on Problems of the Environment (SCOPE) of the International Council of Scientific Unions (ICSU). This book of its proceedings begins with a Joint Report of 171 pp, which includes recommendations and references. The bulk of the book consists of contributed papers, *mirabile dictu*, set in type. A thorough index increases the value of this work.

**Chitin in Nature and Technology.** Edited by Riccardo Muzzarelli, Charles Jeuniaux, and Graham W. Gooday. Plenum Press: New York and London. 1986. x + 583 pp. \$89.50. ISBN 0-306-42211-5

The many typescript papers that make up this volume were given at the third international conference on the subject, held in Italy in 1985. The seven sections are the following: Chitin in Skeletal Structures of Animals; Chitin Synthesis Inhibition; Molecular Recognition and Biodegradation; Chemistry of Chitin; Medical Uses of Chitin; and Chitin Ecology. Besides a subject index, there is an index of organisms.

**Food Emulsions and Foams.** Edited by Erick Dickinson. Royal Society of Chemistry: London. 1987. viii + 290 pp. \$71.00. ISBN 0-85186-626-3 (available from the American Chemical Society, Washington, D.C.)

Souffles, meringues, and charlottes are brought to mind by the title of this book, which contains the lectures and poster presentations from an International Symposium held at the University of Leeds in 1986. However, although there are many photographs of food, not one of them looks delicious. The conferees were single-mindedly concerned with the colloid chemistry of the field, and they present it with mathematical equations, graphs, and photomicrographs. The papers are nicely set in type, but there is no index.

**Proteins at Interfaces: Physicochemical and Biochemical Studies.** Edited by John L. Brash and Thomas A. Horbett. American Chemical Society: Washington, D.C. 1987. x + 706 pp. \$109.95. ISBN 0-8412-1403-4

The 42 pages in this volume are derived from a symposium at the Anaheim meeting of the ACS, held in 1986. After an introductory lecture, "Proteins at Interfaces: Current Issues and Future Prospects", by Horbett and Brash, the remaining papers are arranged in the following groups: Behavior of Proteins at Interfaces; Mechanisms of Protein-Interface Interactions; Advances in Methodology; Role of Protein Adsorption in Blood-Material Interactions, and Applications of Proteins at Interfaces. The subject index is a model of thoroughness.

**Membranes in Gas Separation and Enrichment.** Fourth BOC Priestley Conference. Royal Society of Chemistry: London. 1987. viii + 404 pp. \$72.00. ISBN 0-85086-676-X (available from the American Chemical Society, Washington, D.C.)

The Fourth BOC Priestley Conference was held at the University of Leeds in 1986 and generated 23 typescript papers for this volume. In addition, there is a list of nine poster presentations by title, and a 4-page address preceding the toast to Joseph Priestley at the Priestley dinner. The papers include the Priestley Lecture, "On the Science of Deep-Sea Diving: Observations on the Respiration of Different Kinds of Air", by E. B. Smith, and the BOC Centenary Lecture, "Fundamental Mechanisms of Transport of Small Molecules in Solid Polymers", by P. Meares. Not indexed.

**Ordered Media in Chemical Separations.** Edited by Willie L. Hinze and Daniel W. Armstrong. American Chemical Society: Washington, D.C. 1987. ix + 293 pp. \$54.95. ISBN 0-8412-1402-6

The 16 typescript papers in this volume arose from a symposium held at the ACS National Meeting in New York in 1986. Ten of them fall under the heading Surfactant and Related Systems and are concerned with membranes, micelles, and related matters. The remaining six papers are concerned with cyclodextrins, which can function in both mobile and stationary phases. The concluding paper, "Computer Imaging of Cyclodextrin Inclusion Complexes" (R. D. Armstrong), includes some striking illustrations in color that aid in understanding the usefulness of cyclodextrins in separating stereoisomers. The index of 10 pp is very thorough.

**Non-Oxide Technical and Engineering Ceramics.** Edited by Stuart Hampshire. Elsevier Applied Science: London and New York. 1986. xiv + 458 pp. \$95.75. ISBN 1-85166-042-9

The search for materials that allow higher operating temperatures in heat engines long ago led to ceramics, but conventional ceramics were found to have several limitations: brittleness, poor resistance to thermal shock, etc. Whereas conventional ceramics are based on oxides of metals and nonmetals, there is a much smaller and less well known class, the nitrides, exemplified by silicon nitride, Si<sub>3</sub>N<sub>4</sub>. It is about such substances that a conference was held in Limerick, Ireland, in 1985. A major topic of the conference, sialons and syalons, suggests creatures from extra-terrestrial adventures. They are, in fact, ceramics based on silicon, aluminum, and nitrogen with some oxygen; the syalons have an yttrium component as well.

The 28 papers deal with properties, preparation, characterization, fabrication, testing, etc. The text of a panel discussion and a thorough index conclude the volume.

**Source and Fates of Aquatic Pollutants.** Edited by Ronald A. Hites and S. J. Eisenreich. American Chemical Society: Washington, D.C. 1987. xiii + 558 pp. \$99.95. ISBN 0-8412-0983-9

A symposium on the title subject was held at the ACS National Meeting in Chicago in 1985 and generated the 16 papers in this volume. They are essentially reports of original research and are largely concerned with lakes and their sediments and wetlands and the natural and anthropogenic substances found in them. Five papers are grouped under the heading Air-Water Processes, four under Water Column Processes, three under Water-Sediment Processes, and four under Case Studies. The 17-page index shows exemplary thoroughness.

**Metal Complexes in Fossil Fuels: Geochemistry, Characterization, and Processing.** Edited by Royston H. Filby and Jan F. Branthaver. American Chemical Society: Washington, D.C. 1987. x + 436 pp. \$89.95. ISBN 0-8412-1404-2

The typescripts of 26 papers derived from a symposium held at the ACS National Meeting in New York in 1986 make up this volume. Eleven of them come under the heading Geochemistry, eight under Processing, and seven under Characterization. Most of the papers are reports of original research, but the first one is a 38-page major review, "Geochemistry of Metal Complexes in Petroleum, Source Rocks, and Coal: An Overview" (R. H. Philby and G. J. Van Berkel). A large portion of the papers are concerned with porphyrin complexes, especially of nickel and vanadium. Well indexed.

**Prostaglandins in Cancer Research.** Edited by Enrico Garaci, Roldolfo Paoletti, and M. Gabriella Santoro. Springer-Verlag: Berlin, Heidelberg, and New York. 1987. xii + 288 pp. \$81.00. ISBN 3-540-17548-2

The papers presented at a conference on the title subject, held in Rome in 1986, make up this book. There are two introductory lectures, four on carcinogenesis, five on mechanisms of prostaglandin action, five on cell proliferation and differentiation, and six on immunomodulation. In addition, there are six "brief reports". A thorough subject index augments the polished production.

**Fourier Transform Infrared Characterization of Polymers.** Edited by Hatsuo Ishida. Plenum Press: New York and London. 1987. ix + 449 pp. \$79.50. ISBN 0-306-42582-3

This book collects in camera-ready typescript the papers given at a symposium held at the National Meeting of the ACS in Philadelphia in 1984. The papers are grouped into "chapters", with these titles: Intro-

duction; Polarization-Modulation Techniques; New Instrumentation; Application to Molecular Dynamics and Kinetics; Spectral Analysis and Manipulation Techniques; Surface and Interface Studies, and Application of Optical Theory. Indexed.

**Industrial Chemicals via  $C_1$  Processes.** Edited by Darryl R. Fahey. American Chemical Society: Washington, D.C. 1987. x + 261 pp. \$49.95. ISBN 0-8412-1009-6

The sixteen typescript papers in this book are based on an ACS symposium held in New York in 1986. After a general review, "Synthesis Gas: Feedstock for Chemicals" (W. Klein), there follow three groups of more narrowly focused papers: Developmental Processes; Commercial and Non-Commercial Processes; and New Technical Insights. A thorough subject index is included.

**Radiation Curing of Polymers.** Edited by D. R. Randell. Royal Society of Chemistry: London. 1987. vii + 208 pp. \$32.50. ISBN 0-85186-696-4 (available from the American Chemical Society, Washington, D.C.)

The 16 papers in this softbound volume come from a symposium held at the University of Lancaster in 1986. They emphasize curing of coatings or printing inks by ultraviolet radiation or electron bombardment, and some attention is paid to adhesives. Not indexed.

**Approaches To Elucidate Mechanisms in Teratogenesis.** Edited by Frank Welsch. Hemisphere Publishing Corporation: New York. 1987. xvi + 285 pp. \$79.95. ISBN 0-89116-584-3

The Chemical Industry Institute of Toxicology held its eighth conference in North Carolina in 1986. Fifteen papers from it have been written up as chapters to form this book, and a panel discussion constitutes the sixteenth chapter. The subjects vary from the fairly chemical, such as "Reactive Intermediates in Chemical Teratogenesis", to the more or less clinical. The book is set in type and provided with a 5-page index.

**Trace Metal Removal from Aqueous Solution.** Edited by R. Thompson. The Royal Society of Chemistry: London. 1986. iii + 245 pp. \$29.50. ISBN 0-85186-646-8 (available from the American Chemical Society, Washington, D.C.)

The Industrial Division of the Royal Society of Chemistry organized the symposium, held at the University of Warwick, that gave rise to the 12 typescript papers in this softbound volume. Both biological and chemical methods of recovering or removing metals from water are discussed, and two papers are concerned solely with analysis. Not indexed.

**Optical Properties of Narrow-Gap Low-Dimensional Structures.** Edited by C. M. Sotomayor Torres, J. C. Portal, J. C. Maan, and R. A. Stradling. Plenum Press: New York and London. 1987. ix + 362 pp. \$62.50. ISBN 0-306-42566-1

The many typescript papers in this volume originated in a NATO Advanced Research Workshop held in Scotland in 1986. The subject matter included growth methods and characterization of materials, as well as their optical properties. The papers are grouped under these headings: Theory; Growth and Characterization; Optical Properties and Energy Relaxation; Optical Effects in Quantum Transport; Physics of Devices; and Special Techniques. Well indexed.

**Order in the Amorphous "State" of Polymers.** Edited by Steven E. Keinath, Robert L. Miller, and James K. Rieke. Plenum Press: New York and London. 1987. xiv + 478 pp. \$79.50. ISBN 0-306-42548-3

The Midland Macromolecular Institute held the 17th International Symposium in Midland, Michigan, in 1985, and honored Raymond F. Boyer on his 75th birthday. The contributions fall into three categories: Structure and Order; Contributions of Boyer and his Colleagues; and Polymer Transition Studies. The transcript of a panel discussion concludes the text. A true author index (of references cited) is included, as well as a subject index.

**Particle Size Analysis 1985.** Edited by P. J. Lloyd. John Wiley & Sons: New York. 1987. ix + 669 pp. \$110.00. ISBN 0471-90832-0

The large number of typescript papers in this volume come from the Fifth Particle Size Analysis Conference, held at the University of Bradford in 1985. In addition to plenary lectures, shorter papers are grouped under these headings: Presentation, Manipulation and Interpretation of Data; Standardisation and Reference Materials; Sampling; Microscopy and Image Analysis; Particle Shape and Morphology; Light

Scattering Methods; Sieving Analysis; Electrical Sensing Zone Methods; Surface Area and Porosimetry; Proton-Correlation Spectroscopy and Hydrodynamic Chromatography; and In Situ Particle Size Analysis. Indexed.

**Fuel Cells: Trends in Research and Application.** Edited by A. J. Appleby. Hemisphere Publishing Corp.: New York. 1987. ix + 295 pp. \$64.50. ISBN 0-89116-625-4

The typescript papers in this volume are derived from a "workshop" held in Italy in 1985. Under "fuel cells", the conference included batteries in general, and in addition to cells that utilize combustion of hydrocarbons or hydrogen to produce electricity, such types as aluminum/air and molten salts were discussed. The general conclusion was that fuel cells using hydrocarbons are still not efficient enough to be practical, but hydrogen can now be used advantageously. Fuel derived from biomass is being actively considered. Well indexed.

**Topics in Lipid Research: From Structural Elucidation to Biological Function.** Edited by Roger Klein and Brigitte Schmitz. Royal Society of Chemistry: London. 1986. xii + 336 pp. \$65.00. ISBN 0-85186-353-1 (available from the American Chemical Society, Washington, D.C.)

The Third International Conference in Lipid Chemistry was held in Cambridge in 1986 and produced the 34 papers in this volume. They are grouped under these headings: Platelet Activating Factor; Eicosanoids; Glycolipids; Of Probes and Anaesthetics; Membrane Structure and Function; and Environmental Adaptation. The presentation is uniform and of professional quality, but there is no index.

**Physical Organic Chemistry 1986.** Edited by M. Kobayashi. Elsevier Science Publishers: Amsterdam and New York. 1987. xiv + 654 pp. \$192.75. ISBN 0-444-42806-2

It took seven pages to include all the papers in the table of contents of this volume, which is the proceedings of an English IUPAC Conference on Physical Organic Chemistry held in Tokyo in 1986. The typescript papers are arranged under three headings: Reaction Intermediates; Biomimetic and Biochemical Reactions; Inter- and Intra-Molecular Interactions. There were also 12 plenary lectures and 182 poster presentations, which are listed by author and title. There is unfortunately no index.

**High Pressure Chemistry and Biochemistry.** Edited by R. van Eldik and J. Jonas. D. Reidel Publishing Company: Dordrecht, The Netherlands. 1987. vii + 468 pp. \$96.00. ISBN 90-277-2457-1

A NATO Advanced Study Institute was held in Corfu in 1986 to present the current status of the subject, which has experienced much development in recent years as a result of improved instrumentation and wider availability of equipment for research at high pressures. The typescript papers fall into three groups: General and Physical Aspects; Chemical Aspects; Biochemical Aspects. Indexed.

**Biology of Copper Complexes.** Edited by John R. J. Sorenson. The Human Press: Clifton, NJ. 1987. xix + 598 pp. \$79.50. ISBN 0-89603-123-3

The collection of typescript papers that make up this volume derives from a symposium held at the University of Arkansas in 1986. The papers deal with biological, biochemical, nutritional, pharmacological, medical, and veterinarian aspects of copper. The prevailing theme is that copper complexes facilitate the processes that depend on copper in the natural combat of the body against disease. The spectrum of effectiveness of copper complexes includes anti-cancer, antimicrobial, anti-inflammatory, antiarthritic, and analgesic properties. An 8-page subject index and the texts of 12 poster presentations are included.

**Density Matrices and Density Functionals: Proceedings of the A. John Coleman Symposium.** Edited by R. Erdahl and V. H. Smith, Jr. D. Reidel Publishing Company: Dordrecht, The Netherlands. 1987. xvii + 722 pp. \$139.00. ISBN 90-277-2477-6

The symposium that generated the many typescript papers in this volume was held in 1985 to honor the mathematician A. John Coleman. The text includes a tribute to Coleman by P. O. Löwdin and a collection of papers that range from the pure mathematical to such chemically related subjects as the Schrödinger equation, crystallography, and bond energies. There is a 5.5 page subject index.