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Book Reviews

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Book Reviews†

Inclusion Compounds, Vol. 5, Inorganic and Physical Aspects of Inclusion; edited by J. L. Atwood, J. E. D. Davies, and D. D. MacNicol, Oxford University Press, 1991; 408 pages; ISBN 0-19-855293-9; $98.00.

A great deal of interesting and exciting inclusion chemistry has been reported since the three volume set (*Inclusion Compounds*) was published by these editors in 1984. The aim of volume 5 (*Inorganic and Physical Aspects of Inclusion*) is to update the series with respect to areas that have changed significantly since '84 and to add topics that were not covered in the three volume set. In particular, separate chapters on clathrasils, cyclidenes and solid state NMR are contained in this volume, none of which were given significant coverage in the first three volumes. Each of the chapters is written by an international authority on the subject it covers. While the subjects are written in adequate depth to completely cover all of the important chemistry that has come out, the authors have been very careful to keep them accessible to the reader who is not an expert in the field. The result is a very useful text or reference book on a number of important areas of inclusion chemistry.

A number of different three dimensional host frameworks for inclusion compounds is covered in individual chapters. Clathrasils and zeosils (H. Gies), high pressure clathrate hydrates (Y. A. Dyadin, I. V. Bondaryuk, F. V. Zhurko), cyanometal complexes or Hofmann-type clathrates (T. Iwamoto), transition metal cyclidenes (D. H. Busch, N. A. Stephenson), and cyclodextrins (K. Harata), are all discussed in individual chapters. The chemistry of two dimensional intercalation compounds is also discussed. The two chapters on this subject focus on aluminosilicates (J. M. Thomas, C. R. Theocharis) and zirconium phosphates and phosphonates (G. Alberti, U. Costantino). While catalytic properties of the layered materials are discussed, the primary foci of these chapters are the syntheses and structural characterization of each of these types of inclusion compound. The chapters are well illustrated, making the understanding of sometimes complex structures fairly straightforward. Harata's chapter discusses crystal structures for modified (methylated) cyclodextrins.

Other chapters in this book are based individual physical aspects of inclusion compounds. A chapter is devoted to solid state NMR of inclusion compounds (J. A. Ripmeester, C. I. Ratcliffe). The authors discuss both the structural and dynamical properties, determined by NMR studies, of a wide range of different inclusion compounds. Catalytic aspects of zeolites (N. Herron) and the use of inclusion compounds as chemical sensors (J. C. Lockhart) are also described in individual chapters.

All of the chapters in this volume will be of use to both the scientist that is new

† Unsigned book reviews are by the Book Review Editor.

to the field and would like to find out what it is about and the scientist that is knowledgeable in a given area and would like to use this book as a reference guide. Volume 5 is certainly a good addition to the series started by these editors over eight years ago.

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Advances in Chemical Physics, Volume LXXXI, edited by I. Prigogine and S. A. Rice, An Interscience Publication; John Wiley & Sons, Inc., New York; ix + 821 pages; ISBN 0-471-54570-8; $150.00.

This volume, which clearly maintains the high standards of its predecessors, consists of six chapters: 1) "Transition State Spectroscopy of Bimolecular Reactions using Negative Ion Photodetachment"; 2) "Infrared Vibrational Predissociation Spectroscopy of Small Size-Selected Clusters"; 3) "The Dynamics of Triplet Excitons in Mixed Molecular Crystals"; 4) "Theoretic Physicochemical Problems of Clathrate Compounds"; 5) "Simulation and Symmetry in Molecular Diffusion and Spectroscopy"; and 6) "Vibronic Interactions in Polynuclear Mixed-Valence Clusters." The final four chapters will likely have the most appeal to the readers of this journal. The volume has both author and subject indices.

In the third chapter, R. Brown and P. Kottis discuss triplet excitons in isotopically mixed crystals of naphthalene. They review the debate on wavelike vs. hopping character of exciton transport in these disordered crystals with the view toward discussing such phenomena in more strongly disordered systems such as glasses. Various theoretical approaches to these problems are examined.

In the fourth chapter, V. E. Zubkus, E. E. Tornau, and V. R. Belosludov review the experimental structural and thermodynamic aspects of clathrates of hydroquinone, hydrates, and urea and thiourea and go on to outline a theoretical framework for the discussion of these properties. Potentials for both host-guest and guest-guest interactions are discussed. Spelling errors and a nonoptimal use of English detract from an otherwise useful treatment.

The fifth chapter by M. W. Evans is 342 pages in length and cites 439 references. It treats problems in molecular diffusion from Einstein's work on Brownian motion to the present, and includes a 40 page appendix of the molecular dynamics simulation algorithm "TETRA." The latter was used extensively in much of the work reviewed. The chapter includes the application of group theoretical statistical mechanics of the dynamics of nematogens and cholesterics in certain point groups as well as a discussion of symmetry in smectic liquid crystals.

In the final chapter, I. B. Bersuker and S. A. Borshch apply a model related to the pseudo Jahn-Teller effect developed by Piepho, Krausz, and Schatz to problems of the electronic states and vibrations of mixed valence transition metal clusters.

Applications to other systems, both inorganic and organic, are mentioned, and directions for further work are outlined.

Applied Photochromic Polymer Systems, edited by C. B. McArdle (Blackie, 1992); ISBN 0-216-93140-1; vi + 255 pages.

This book, written in English emphasizing the device application aspect of photochromic polymer systems, is complimentary to the book entitled "Photochromism: Molecules and Systems," edited by H. Durr and H. Bouas-Laurent (Elsevier, 1990), which treated the photochromism of organic compounds from a more fundamental and tutorial approach. It is especially beneficial to those who are interested in the practical applications of photochromic materials but are not proficient in Japanese or in Russian. The polymer systems cover both solid solutions of photochromic compounds in polymeric substrates and polymers which inherently exhibit photochromism by incorporating a photochromic functional group as a pendant or in the backbone.

There are six chapters in the book. Each chapter covers a specific class of photochromic polymer system with the exception of the first chapter. The five photochromic systems reviewed are spiro-oxazines, fulgides and fulgimides, viologens, liquid crystal polymers and photoresponsive polymers. A comprehensive discussion of the synthesis, photochemical and photophysical properties, and photochromic performance is presented for each system. This is followed by a general discussion of the practical applications which may be commercialized or are in the development stage.

The first chapter addresses the optical device applications of numerous photochromic polymer systems in the areas of optical storage, optical imaging, optical signal processing and integrated optics. The critical performance parameters of these photochromic devices are analyzed in detail and compared to those of competitive technologies. This gives a realistic appraisal of their potential industrial value. For an organic photochromic compound, the spiro-oxazines have excellent photodurability. This, together with their desirable photochromic performance, fits the requirements of eyewear lenses and, thus, accounts for their commercial success. The unusual thermal stability of certain fulgides and related derivatives is particularly useful for construction of many optical devices. Some fulgides have also been successfully used in actinometry.

Although the book is intended to cover photochromic polymer systems having real or potential industrial applications, it is well referenced in both scientific and patent literature. For this reason, the book will serve well for those who have a basic understanding of photochromism and are interested in its many and diverse practical applications. It should appeal to researchers of different disciplines in academia and in industry. Because the scope of the book is limited to polymer systems, biological photochromic systems and photochromic glasses are not cov-

ered. Those who are interested in these subjects will have to refer to other recent books or review articles.

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