

Book Reviews

Thermal Analysis: Fundamentals and Applications to Polymer Science. By T. Hatakeyama and F. X. Quinn (National Institute of Materials and Chemical Research). John Wiley & Sons: Chichester, U.K. 1994. vii + 158 pp. \$54.95. ISBN 0-471-95103-X.

This book offers an excellent overview of the principles of most of the major methods in thermal analysis. It discusses instrument configuration and offers a complete discussion of the mechanics of sample preparation, calibration, test conditions, and the importance of all of these to the attainment of reliable results. In the area of DSC it gives a thorough account for most of the uses for DSC and TGA testing. Those applications that are discussed are treated thoroughly and explained clearly and precisely. Tables and appendices provide a good complement to the text.

Unfortunately, the applications portion of the book is devoted almost entirely to DSC and TGA, with the emphasis on DSC. Within the discussion on DSC there is no treatment of high-pressure techniques which are used to evaluate the curing process in thermosetting polymers that cross-link through a condensation reaction. These high-pressure processes are also important in evaluating the oxidative stability of a wide range of materials including many important addition polymers such as the polyolefins. The section on modulated DSC also needs to be re-evaluated. In spite of some of the shortcomings noted in this section, MDSC has already shown the ability to illuminate behaviors which the authors mention as problematic in later discussions on the limitations of DSC. Specifically, the ability to directly observe crystallization during premelting, resolve overlapping transitions such as T_g and enthalpic relaxation, and make direct measurements of specific heat are too important to dismiss with a single paragraph.

The biggest problem, however, lies in the cursory treatment of techniques such as TMA, DMA, and TSC. In terms of resolution and the information these techniques provide, they are the most powerful of the TA techniques and deserve a section which could easily double the size of the book. In addition, no mention at all is made of dielectric analysis (DEA). While the book outline promises help with interpretation of test results, no such interpretation information is forthcoming for these techniques.

Finally, this book would be helped by more references to specific work that illustrates the utility of the various techniques. In particular, there are no references cited in Chapter 6, the chapter that deals with the techniques of DMA, TMA, TSC, and many of the advanced, simultaneous techniques.

In short, this book is excellent as far as it goes, it simply doesn't go far enough to live up to its title. In 1981, Edith Turi and her colleagues needed almost 1000 pages to cover this topic. And while there is admittedly more detail in her book than most beginners would ever want, this topic is just too big to cover thoroughly in 158 pages.

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Stereoselective Synthesis, Volume E21c. Edited by Gunter Helmchen (Heidelberg), Reinhard W. Hoffman (Marburg), Johann Mulzer (Berlin), and Ernst Schaumann (Clausthal). Georg Thieme Verlag: Stuttgart. 1995. xv + 1078 pp. DM2500. ISBN 3-13-798004-6.

The third volume in the Houben-Weyl set for *Stereoselective Synthesis* continues the elaborate treatment of the synthesis of chiral compounds by carbon-carbon bond formation that was begun in the first volume of this comprehensive series. Volume E21c discusses and develops addition to olefinic double bonds and pericyclic reactions with approximately equal number of pages devoted to each of these two general topics. A total of 24 authors of international standing contributed to this volume.

The formation of C-C bonds by addition to olefinic double bonds encompasses sections on additions of free radicals, additions of carbocations, allylic substitutions catalyzed by palladium complexes, hydroboration, and organometallic addition reactions that include, among numerous topics, hydroformylation, hydrocarboxylation, and hydrocyanation. Free radical additions, although relatively new as a synthetic methodology, is developed with a critical sensitivity to the synthetic potential of this rapidly developing field, and the same is true for palladium-catalyzed allylic substitutions and organometallic addition reactions. With more established topics, additions of carbocations and hydroboration reactions, subtopical listings, and examples have been selected to provide maximum advantage to the reader in understanding the scope and limitations of these methodologies. Among the topics included within the section on organometallic addition reactions and catalysis, there is some redundancy (e.g., cyclopropanation, [4+2] cycloaddition) relative to more thorough subsequent developments, but generally, the treatment provided is unique and thorough.

The half of this volume devoted to the formation of C-C bonds by pericyclic reactions begins with [4+2] cycloaddition, both intermolecular and intramolecular, catalytic and noncatalytic, and continues with 1,3-dipolar and [3+2] cycloadditions. Intermolecular and intramolecular [2+2] cycloadditions, particularly those involving ketenes and keteniminium salts, and [2+2] photocycloadditions, especially the Paterno-Büchi reaction (including a 25-page tabular survey), are prominent. An excellent, thorough treatment of [2+1] cycloaddition reactions, that includes catalytic and stoichiometric metal carbene additions, continues this authoritative compendium of stereoselective reactions. Ene reactions complete this volume, and the subsequent volume (E21d) continues further treatment of pericyclic reactions.

Enantioselective processes are highlighted, especially for those transformations that have recently seen remarkable developments in catalytic or auxiliary-based enantiocontrol. Drawings of chiral catalysts and/or ligands are clearly presented. Literature references through 1994 and into 1995 are provided; the two styles used suggest additions/revisions for each section necessitated by delays in publication, but the outcome resulting from these changes has been advantageous in thoroughness and clarity. As in previous volumes, typical procedures are provided so that the overall result is a series that is useful not only as a textual reference but also as a practical laboratory guide.

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