for example, to probe the validity of proposed reaction mechanisms and to elucidate the factors which stabilize conformations of macromolecules. The experimental approaches required for such studies are unfamiliar to most workers not directly involved in this field, and it is the objective of this volume to attempt to provide a practical introduction.

The book begins with a fairly extensive description of methods of pressure generation, including a substantial section on diamond anvil cells, the most widely used type of cell for pressures above 1 GPa (10 kbar). A short chapter then outlines methods of pressure determination; a useful feature of this chapter is the inclusion of several luminescence pressure sensors which complement the well-known ruby fluorescence scale. A survey chapter then describes briefly, in turn, the procedures for various types of physical measurements, e.g., electrical properties, X-ray diffraction, neutron scattering, and optical measurements.

The remaining five chapters of the book, which constitute the bulk of the volume, cover topics which should be of interest and importance to chemists; despite its title, the overall focus of this book is on chemical or molecular problems, rather than topics of physical or geophysical interest. For example, a section by Buback and Hinton nicely describes approaches for kinetic studies of reactions at high pressure and high temperature, using vibrational spectroscopy to monitor concentrations. Equipment for high-pressure NMR is described in a section by Helm, Merbach, and Powell, and in a chapter by Price and Ludemann, which focuses on measurements of self-diffusion and relaxation times in liquids. A chapter by Magde and van Eldik presents in cogent terms the general considerations for pressure studies of reaction thermodynamics and kinetics, showing designs for pressure generating equipment and sample cells, and discussing the implementation of several spectroscopic, electrochemical, and other techniques to measure species concentrations, along with guidelines for the interpretation of data. A section by Isaacs very nicely describes the application of high pressure to organic synthesis, giving useful schematics for equipment and presenting many examples of reactions and reaction types whose rates are affected by pressure, along with typical values for the volumes of activation. A final chapter by Masson describes application of high pressure to electrophoresis of proteins and the interpretation of effects on, for example, protein conformation and oligomeric equilibria.

A helpful feature of the book is that these applications chapters are largely independent of each other, so that one may pick and choose. Some additional detail on pressure generation or measurement from the introductory chapters is helpful in some cases.

The chapters are generally well written, and give enough background and basic theory so that the general reader will know why high-pressure studies are useful in a particular area, and what can be learned. It is to be realized that these chapters are not reviews of results of pressure studies; nevertheless, most chapters present some typical and recent results of interest, and citations to several review articles are included. The most recent references in the volume are from 1995, with just a few from 1996. In some cases, unpublished recent designs from the authors' laboratories are presented. The major emphasis of the volume is the "practical approach", so there are extensive drawings or schematics of equipment, with accompanying specifications. A unique feature is the "protocols", which give, in some cases, fairly detailed, step-by-step procedures for, e.g., preparation of gaskets for diamond anvil cells, loading a high-pressure cell with a sample, and carrying out particular types of measurements under pressure. A list of commercial suppliers (most of them European, reflecting the authorship of the chapters) is given at the end of the book, along with an appendix focusing on safety aspects.

Does the book accomplish its objective? It can certainly be said that this volume does introduce the reader to a wide range of equipment and procedures for high-pressure work, along with examples of the types of information which can be gleaned from these studies. If one desires a more extensive discussion of results in particular area, one can consult the several reviews cited in the chapters. Despite the fact that the book is intended to highlight the practical aspects, I think it is unlikely that a novice would be able to design, construct and use most of the equipment presented here without first receiving some advice and help from a group working in the relevant area. The book is not a stand-alone manual for the conduct of high-pressure experiments; it is, however, a useful and up-to-date introduction to the practice of high-pressure research.

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Ionomers: Synthesis, Structure, Properties and Applications. Edited by M. R. Tant (Eastman Chemical Company), K. A. Mauritz (University of Southern Mississippi), and G. L. Wilkes (Virginia Polytechnic Institute & State University). Chapman & Hall: New York. 1997. xiv + 514 pp. $144.95. ISBN 0-7514-0392-X.

Ionomers are a subclass of ion-containing polymers that typically contain less than 15−20 mol % of ionically functionalized units and possess physical and/or morphological properties that are dominated by specific electrostatic interactions. Over the last 30 years, the emerging field of ionomer science has generated a wealth of experimental and theoretical information on a wide range of ionomeric systems with varied composition, molecular architecture, and morphology. Moreover, due to the current advancements in synthetic and analytical capabilities, the international interest in these complex materials has grown steadily in academic and industrial arenas since the last comprehensive treatment of the field of ionomers by Eisenberg and King (*Ion-Containing Polymers*), published in 1977. As such, the extensive overview provided by this text serves as a timely update in truly defining the current state-of-the-art in the field of ionomers.

In contrast to other field specific surveys containing a collection of edited chapters covering only the specific research efforts of a limited number of contributors, the editors of this book have taken a refreshing and exceptionally valuable approach of organizing a group of expert scientists with the charge of compiling comprehensive overview chapters encompassing all major areas of interest in the field. The text is logically organized in a fashion that follows a typical systematic research protocol of synthesis and structural characterization (Part One), followed by structure and property analysis (Part Two), which leads to applications (Part Three). Chapter 1 covers the synthesis methods and molecular structure characterization of many anionomers, cationomers, and zwitterionomers. The development of classical random ionomers is compared to the tailored ionomers having controlled molecular architecture for model studies. Chapter 2 focuses on probing morphology by a wide array of spectroscopic techniques, X-ray and neutron scattering, and TEM methods. The state-of-the-art information in this chapter provides a fundamental basis for the morphological theories in Part Two of the text.

Chapter 3 is a detailed survey of the numerous morphological models and theories that have been developed in the field. Particular attention has been paid to important comparisons and contrasts between the various treatments with respect to current experimental and theoretical information in the literature. Chapters 4 and 5 provide an in-depth review of the solution and melt rheology properties of ionomers. These chapters detail the influence of complex electrostatic interactions, as they impact rheology, morphology, and ultimate processing of ion-containing polymers. A valuable comparison of the structure and properties of the general classes of hydrocarbon-based and perfluorinated ionomers is offered in Chapters 6 and 7.

Part three involves the wide range of ionomer applications stemming from the unique chemical and morphological structures outlined in the preceding chapters. The carefully described applications include membranes, packaging, blend compatibilization, urethane-based dispersions and coatings, and elastomers.

In summary, this text offers an excellent survey of the technologically important research and applications of ionomers. With the detailed descriptions of past and present research and development, coupled with the extensive referencing at the ends of each chapter, this text will certainly serve as a principal resource to students, faculty, industrialists, and other scientists and engineers with interests in the realm of ionomers.

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