Book Reviews

Investigation of Rates and Mechanisms of Reactions. Third Edition. Part 2. Investigation of Elementary Reaction Steps in Solution and Very Fast Reactions. Edited by G. G. HAMMES (Cornell University). Volume 6 in the series **Techniques of Chemistry**, edited by A. WEISSBERGER. John Wiley & Sons, New York, N. Y. 1974. xiii + 665 pp. $27.50.

There may be some confusion about the relationship between the present series, entitled "Techniques of Chemistry," and the former classic series, "Techniques of Organic Chemistry," as well as its companion series, "Techniques of Inorganic Chemistry." The fact that many of the techniques described are actually being used within all branches of chemistry has led to the removal of the words "organic" and "inorganic" from the titles. The present series is apparently considered to be just a continuation of the earlier ones since this book is labeled as a third edition. The second edition was published in 1963 within the series "Techniques of Organic Chemistry."

Although several of the thirteen chapter titles and authors remain the same as in the second edition, almost all of these chapters have been extensively rewritten. As is frequently the case for books of this type, one might wish that there were a smaller lag between the times of writing and publication; however, virtually all of the chapters contain at least some references to literature from 1972, and a few even reference some 1973 work.

The chapters are all highly informative and are for the most part well written. The level of the approach to the subject varies to some extent from chapter to chapter; however, the range is such that the book should be very useful, both to chemists interested in learning and using the techniques, and to those just wanting to become more familiar with techniques currently being employed for the study of fast reactions. Emphasis is placed on the principles and equipment being used in the various methods, without extensive discussion of experimental results.

The titles and authors of individual chapters are listed below, since these should be helpful in deciding whether to purchase this book.

"Introduction," by G. G. Hammes; "Rapid Flow Methods," by B. Chance; "Theoretical Basis of Relaxation Spectrometry," by M. Eigen and L. De Maeyer; "Temperature Jump Methods," by G. G. Hammes; "Pressure Jump Methods," by W. Knoche; "Electric Field Methods," by L. De Maeyer and A. Persoons; "Ultrasonic Methods," by J. Stueher; "Electrochemical Methods for the Investigation of Fast Chemical Reactions," by H. Strehlow; "Photostationary Methods," by R. M. Noyes; "Flash Photolysis," by G. Porter and M. A. West; "Pulse Radiolysis," by L. M. Dorfman; "Nuclear Magnetic Resonance," by T. J. Swift; and "Electron Paramagnetic Resonance," by H. S. Chen and N. Hirota.

Also worthy of note are an author index and a subject index.

George E. Busch, *University of Colorado*

Thermodynamics of Solids. Second Edition. By RICHARD A. SWALIN (University of Minnesota). John Wiley & Sons, New York, N. Y. 1972. xii + 387 pp. $19.50.

The demand for more sophisticated materials by our modern technology is growing. The complex problems in solids that we thus face can no longer be attacked adequately by people trained in traditionally narrow disciplines. Swalin has attempted in this book to bridge the gap between chemists, material scientists, metallurgists, and physicists. It is a difficult task because of the different approaches, emphases, and languages used in different disciplines. Despite these difficulties, the author did manage to acccomplish his goal to a certain extent in acquainting the readers with many seemingly different approaches and concepts. To be fair, the book is still more material-science oriented, as would be expected since it was an outgrowth of lecture notes for students in this area.

The main topics covered in this new edition are similar to those in the first edition, except for slight alterations in sequence and the inclusion of additional information as reflected in the increase of 46 pages of the text. The former makes the plan more coherent, and the latter not only adds more examples but also updates the contents. The first five chapters of the book deal mainly with general thermodynamic concepts coupled with statistical interpretation. The next five chapters discuss the thermodynamic equilibrium in different phase diagrams of alloy systems, especially in terms of activity concepts. The last five chapters are concerned with different types of defects in solids using approaches of chemical activity and the law of mass action. This last part of the book provides a clear and useful introduction for readers interested in defects in solids. Many illustrations throughout the book are very helpful in elucidating the application of the basic thermodynamic concepts.

"Thermodynamics in Solids" can be used as a textbook in a thermodynamics course in material science or metallurgy for students with some knowledge of atomic physics. These users may find it useful to compare this book with "Heat and Thermodynamics" by Mark W. Zemansky for more information about difficult thermodynamic concepts, and with "Introduction to Solid State Physics" by Charles Kittel for a more detailed description of different phenomena in solids. This book is also good reading material for chemists, material scientists, metallurgists, and solid-state physicists, especially for the experimentalists.

Ching-Wu Chu, *Cleveland State University*

Kinetics of Ziegler-Natta Polymerization. By T. KEII (Tokyo Institute of Technology). John Wiley-Halsted. New York, N. Y. x + 262 pp. $18.50.

The aim of this book is to take the large body of research on Ziegler-Natta heterogeneous catalysis and provide a unifying theory based on adsorption kinetics for the many catalysts that are categorized as Ziegler-Natta types. The author discusses in some detail the experimental and theoretical bases for the kinetic theory presented. This complex analysis is presented in an extremely lucid manner, discussing along the way such practical matters as the effect of stirring speed and grinding of catalyst particles on polymerization.

The various mechanisms proposed for Ziegler-Natta catalysis are evaluated in the terms of kinetic behavior. The author feels that Cossee's monometallic theory based on the formation of active centers on a titanium halide surface with a chlorine vacancy best fits the adsorption kinetics of a Rideal type found by experiment. The heart of the book is in Chapters 2 and 3, which present the experimental evidence and the theory required to explain the evidence. The reader does not have to be conversant with adsorption theory to follow the arguments presented since all the background theory is masterfully presented.

The book is generally very clearly written and the translator, W. R. S. Steale, should be congratulated on his efforts. This volume can be usefully read by workers in the field of olefin polymerization as well as graduate students of polymer and physical chemistry.

Robert J. Zeitlin, *Chemplex Company*