BOOK REVIEWS

Polymerization Kinetics

Kinetics of Ziegler-Natta Polymerizations. By Tominaga Keii. Pp. x+262. (Kodansha: Tokyo; Chapman and Hall: London, November 1972.) £6.

SINCE the discovery by K. Ziegler some twenty years ago that transition metal halides and aluminium alkyls in hydrocarbon media could effect the polymerization of ethylene at room temperature and pressure, some 10,000 papers and a like number of patents have been published. To attempt to present "a comprehensive discussion of the experimental data on the basis of heterogeneous kinetics" is indeed a formidable task, and most polymer chemists are going to be extremely grateful to Professor Keii for this slim volume of eight chapters, which contains a concise yet lucid review of this very complicated but fascinating polymerization system. It is also most instructive to read an account by a leading Japanese scientist who has himself made a worthwhile contribution both to the experimental study and to our understanding of these systems.

During these past years quite a number of reviews of Ziegler-Natta polymerization have appeared, but this book is in some ways quite different. Professor Keii has not given us only another presentation of experimental findings, but he sets out to relate the general kinetic behaviour of these systems to our present understanding of kinetic theory, and in so doing to examine the applicability of various kinetic models. He thus makes a distinct contribution which helps considerably to clarify some of the many conflicting experimental findings. All in all, it is a good example of the value of the kinetic treatment when applied to a complex reaction.

Chapter 2 deals with the kinetics of propylene polymerization. Although the pioneer work of G. Natta and his coworkers is covered, later work by Japanese workers is emphasized. This chapter, together with chapter 5 (ethylene polymerization), is most incisive and deserves careful study. Chapter 3 is concerned with kinetic models for propylene polymerization and, although rather short, is one of the

most valuable chapters in the book. Too much work in Ziegler-Natta polymerization has suffered from the lack of an adequate theoretical foundation, and Professor Keii places us in his debt by his careful analysis. The stereoregularity of polymers produced by Ziegler-Natta catalysts has been the main interest of industrial research and this aspect is covered in chapter 4 and further in chapter 5, when the effect of electron-pair donors and surface heterogeneity is reviewed. These subjects still remain among the least understood in Ziegler-Natta polymerization. The final chapter (chapter 8) on the mechanism of polymerization provides a useful conclusion to the book, but it is nevertheless somewhat short and our present imperfect understanding makes it necessarily inconclusive.

A few criticisms can be offered. The treatment given is mostly limited to propylene and ethylene polymerization, and there is little mention of soluble Ziegler-Natta polymerization systems. In this respect the coverage is limited. Omissions of this type are perhaps inevitable, but they do not seriously detract from the obvious value of this book, which most workers in the field will wish to possess for themselves.

P. J. T. TAIT

Chemical Computing

Computers in Chemical and Biochemical Research. Edited by C. E. Klopfenstein and C. L. Wilkins. Volume I. Pp. xii+265. (Academic: New York and London, September 1972.) \$14.

THIS book is the first of a new series which claims to introduce research workers in chemical and biochemical research to the advantages of employing real-time computer techniques.

There are seven distinct sections in this volume, three of which (more than half of the book) include material which has already appeared in print. These cover the "Training of Chemists in Laboratory Computing" — describing courses for undergraduate and postgraduate students, the "Mulheim Com-

puter System"—a complex PDP10 configuration, and "Fourier Transform Spectrometry in Chemical Research"—small computers used with infrared and nuclear magnetic resonance spectroscopy.

Two of the other sections, "A Laboratory Computer System for Biochemical Research" and "The Dedicated Computer in Electron Spin Resonance Spectroscopy", also deal with the use of small computers in specific areas. "Multiprocessor Systems in Laboratory Automation" gives a very good overall account of the potential of computers in data acquisition techniques, while the last article, "A Practical, Computer-based Information Retrieval System", describes a FORTRAN language program suite for handling a small (10,000 reference) data base.

In spite of being aimed at potential new computer users, the book is rather full of jargon. I am fairly certain that any reader who can understand it all has little need to read this book. The styles of the contributors are, as one might expect, rather different and vary from those very easily read to those which I found hard going after the first few paragraphs. Taken as a whole, it is not a book that I would recommend anyone to go out and buy without first inspecting a copy to assess its possible relevance to his own field of interest. If future authors in this series can avoid presenting previously published material and keep their standards up to those of the best sections in this volume, future members of the series should help many research workers to adapt to computer techniques.

J. G. SIME

Erratum

IN C. A. Russell's review of *Chemistry*, by L. W. Fine (*Nature*, **242**, 64; 1973), the last sentence in the first column should read, "This gives wrong dates for contributions by Berzelius and Frankland, implicitly ascribes to Gay-Lussac work on combining weights . . .", and not ". . . incorrectly ascribes to Gay-Lussac . . .".