largely on the summer course in biochemical engineering presented at RPI. The objectives of the book, other than to complement other textbooks in biochemical engineering, are not clearly defined, however, so one is left to assume that it is intended as either a teaching text for advanced students of biochemical engineering or as a reference source for practicing biochemical engineers. It is difficult to endorse the book strongly as either. There are no problems or other pedagogical exercises that distinguish the book as a textbook; in only a few instances, do the contents qualify as advanced reference material for biochemical engineers. Instead, the book can best be described as a compilation of review articles, some of which serve only to aquaint the unfamiliar reader with basic concepts, others of which examine topics in greater detail.

These points are demonstrated throughout the book. Chapters 1 and 2, a breakdown of biochemical product categories and an introductory chapter on cells and enzymes, respectively, seem to be directed toward an audience with no prior background in either the commercial or scientific aspects of biochemical engineering. Evidence of this claim ranges from the anthropomorphic representations of microbial cells in Figure 2.1 (inappropriate for any serious text) to the rudimentary coverage of enzyme kinetics at the end of the chapter. Likewise, Chapter 1 is a rather uninspiring synopsis of what biotechnology has produced in the past and can be expected to offer in the future.

Chapter 3 on the analysis of biological reactors adopts more of an advanced flavor by reviewing modeling concepts and by presenting results from selected computer simulation studies, but this chapter could benefit from less emphasis on computational analyses and greater attention to novel problems encountered in the operation of real systems. Nonideal reactors are not covered at all, nor is there discussion of reactor design strategies for alleviating problems associated with the likes of plasmid instability, cell recycle, filamentous organisms, or shear-sensitive mammalian cells.

Subsequent chapters generally follow one of two patterns: the chapters most relevant to biochemical processing (e.g., Chapter 4 on biomass refining and Chapter 8 on product recovery) are similar in form and content to review articles that have appeared elsewhere, and the chapters covering more fundamental topics (e.g., Chapter 5 on recombinant DNA and Chapter 9 on sorption) are overviews of material covered more extensively in other monographs.

This is not to say that the book is without some merit. The chapters on molecular enzyme engineering and on the molecular biology of industrial microorganisms contain many interesting and relevant examples, and the final chapter is an excellent survey of membrane separation technology. Moreover, the book is of general value in that it assembles timely information on several topics in a single source. But on the whole, the book lacks a strong identity and is inconsistent in its depth of coverage. Thus, those seeking an introduction to various topics pertinent to biotechnology (as opposed to the more specialized field of biochemical engineering) will find this text useful, although some chapters are much better in this regard than others. On the other hand, those expecting an advanced treatise on biochemical engineering, as promised by the title, will not be entirely satisfied.

D. S. Clark
Dept. of Chemical Engineering
University of California
Berkeley, CA 94720

Polymer Science

By V. R. Gowariker, N. V. Viswanathan and J. Sreedhar, John Wiley & Sons, Inc., 505 pp., 1986, $39.95

Polymer Science contains 15 chapters; a bibliography and an appendix consisting of a list of universities/institutions offering courses on polymer science and technology. The chapters include the traditional sections on chemistry of polymerization, molecular weight and size, kinetics of polymerization, copolymerization, a list of individual polymers, polymer reactions and polymer degradation. The book also contains sections on the structure of macromolecules, the glass transition temperature, crystallinity, polymer solutions and processing.

The book jacket claims that these "15 chapters are aimed to raise the reader to a level where he/she can easily assimilate other specialized and exhaustive treatises on the subject." After reading the text this reviewer has come to the conclusion that the authors have not reached their goal. This book is too superficial particularly with the physico-chemical and physics aspects of polymer science. There is no mention of rubber elasticity, rheology, chain stiffness and liquid crystals, crystalline unit cells, crystallization rates, etc. The section on physical methods does not include melting behavior. No section deals with the important issue of structure/property relations in polymer materials. A better title for this book would be *An Introduction to Polymer Chemistry.*

A number of erroneous statments are made. Examples are: the useful range of degrees of polymerizations (claimed to be only 200–300), remarks on polymer dissolution, and polymer crystallinity. Some of the values of melting points and crystallinities are highly misleading. High-density polyethylene, for example, is thought to have typical values of 144–150°C and 90% for the melting point and crystallinity, respectively. The book certainly will not serve, contrary to the authors' hope, as a "Handbook on important polymer-related properties."

The language used in the book is unusual. The printing is of moderate quality and the reproduction of photographs is poor.

Many of the existing textbooks listed in the bibliography cover the topic in a better way. Finally, the list in the appendix of universities and institutes with polymer-related programs fails to mention important centers such as, Leeds and Bristol in Great Brittain, Freiburg and Mainz in the Federal Republic of Germany, for France and the USSR, only one entry each, and Dutch institutes are ignored.

Paul Smith
University of California
Materials Program and Department
of Chemical & Nuclear Engineering
Santa Barbara, California 93106