

BOOK REVIEWS

very brief. Only two pages are devoted to the Debye-Hückel theory. Although this brevity is in accordance with the theme of the book, current interest in solutions of electrolytes would seem to dictate a more complete treatment.

There are no tables of thermodynamic data such as are usually contained in books on thermodynamics. The problems are generally well chosen but difficult. All the problems are worked out in Appendix IV, but one finds very few examples worked out in the text.

The naming of quantities and choice of symbols conform to the suggestions of the International Organization of Standardization. The notation is somewhat difficult to become accustomed to but is used carefully and consistently throughout the book.

The printing of the book is well done. Only one typographical error was found (line 2 on page 134). The paper and binding are barely adequate. For the price one would hope for better.

The book is an excellent text for the student who wants to learn what thermodynamics is all about. It contains nothing that will have to be set aside as unimportant or only half true. The book is not a typical textbook of thermodynamics but an elegant discussion of the essence of thermodynamics by one whose understanding of and affection for the subject are clearly evident.

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Topics in Enzyme and Fermentation Biotechnology 3

Alan Wiseman, (Editor), University of Surrey, Guildford, Ellis Horwood Limited, Chichester, 1979. v + 295 pp. Figs. and tables. 23 X 15.5 cm. \$54.95.

This volume is the third in a continuing series of separately authored chapters on widely-ranging topics in the general area of enzyme technology. The six chapters are entitled: Uses of Oxyanions in Enzyme Equilibrium Displacement, Developments in Microbial Extracellular Enzymes, "Rennets" and Cheese, Scale-Up of Fermentation Processes, and New and Modified Invertases and Their Applications.

The chapter on Uses of Oxyanions in Enzyme Equilibrium Displacement by S. A. Barker and P. J. Somers gathers together a great deal of useful information on complexing of anions such as borate, germanate, molybdate, and tungstate to polyhydroxylic structures, a great many of which are carbohydrates and related substances such as NAD and glycoprotein enzymes. The effects of oxyanions on enzyme-catalyzed aldose-ketose interconversions for a number of carbohydrate pairs is described together with some information on the specific enzymes, such as their specificities and the equilibrium positions of the various reactions. This part is somewhat incomplete and some of the references are quite dated. Nevertheless, the information on the chemistry and role, or potential role, of one polyanion or another in shifting the equilibrium position of such reactions so as to increase the yield of the desired form will be very useful to those who plan either basic laboratory experiments in

order to gain new fundamental information or to others who have practical applications in mind.

The chapter by Fogarty and Kelly, "Developments in Microbial Extracellular Enzymes," contains a detailed survey of sources and types of α -amylase, β -amylase, other amylases, amyloglucosidase, amylopectin debranching enzymes, cellulases, pectinolytic enzymes, and proteases. A short section on general factors to be considered in enzyme production is included, along with brief descriptions of new methods for production and purification of certain of the enzymes listed above. It would seem, considering the increased interest in biomass fermentations, that the section on cellulases will be of particular interest.

Another section on immobilized enzymes is also very timely. The authors have made a useful survey of the types and applications of immobilization. However, this subject is much too large and complex to receive full treatment here. Particularly missing are the chemistry of immobilization and the effects of immobilization on behavior of enzymes.

The chapter entitled "Rennets" and Cheese, by R. Scott, is highly specialized, but it is a valuable source of information to food processors, especially those in the area of dairy manufacturing. It gives a good view of the complexity of the casein system, the types of processes involved in cheese making, the role of other milk components in the coagulation process and the many proteolytic enzymes from numerous enzyme sources which can have a "rennet" function. Also treated are the types of cheese and the proteases used in their manufacture as well as applications (or lack of application) of immobilized enzymes.

The chapter, "Scale-Up of Fermentation Processes," is a small textbook concerning management of cultures, sterilization procedures and physical conditions for making the transition from laboratory scale to much larger fermentations. In this case, as is common in the applications area, the word "fermentation" is used in a broad sense to mean conversion by microorganisms of a material to products under either anaerobic or aerobic conditions. Engineering considerations in achieving optimal oxygen availability are also included. A major use of this chapter will probably be by those engaged in the conversion of a laboratory process to pilot plant and higher scale; however, there is also very valuable information for those research scientists who wish to "scale-up" newly discovered processes in their laboratory using one of the several commercially available, but not necessarily small, laboratory fermentors. Such investigators, often coming from a variety of fields, may not be aware of the many factors involved and hence succeed suboptimally, marginally, or not at all.

The chapter by Wiseman, New and Modified Invertases and Their Applications, presents a comprehensive survey of the chemistry of invertases from various sources. His treatment of the subject matter (in particular, the section on chemical stabilization and immobilization) is very thorough and obviously well researched. However, portions of the chapter suffer from some excess verbiage, overuse of parenthetical expression, and inclusion of unnecessary information which detract from an otherwise smoothly flowing treatise.

Overall this volume, especially together with the others in the series, is a useful source of information applicable broadly across bi-

ological research and is by no means limited in usefulness to industrial pilot plant facilities and their support laboratories.

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Energy: The Next Twenty Years

Hans H. Landsberg, et al., (Editors), Balingier Publishing Co., Massachusetts, 1979. xi + 628 pp. Figs. and tables. 23 X 15 cm. \$9.95.

It is not often that a document as timely as "Energy: The Next Twenty Years" appears on the scene. This report, administered by Resources for the Future and sponsored by the Ford Foundation, does the public a great service in focussing attention on the remainder of the 20th century. This is indeed the critical period of the nation's energy future. Yes, it is timely, but contrary to what McGeorge Bundy, former head of the Ford Foundation, says in his Foreword to this current document it would undoubtedly have been more timely in 1974 if it had been issued instead of that earlier document, "A Time To Choose." For it was this first document which espoused and helped promulgate public policies that must be blamed for much of the ill-advised and counter-productive legislation and regulation which is largely responsible for continuation of the nation's energy dilemma.

"Energy: The Next Twenty Years" reports the finding of a study by a panel of knowledgeable, experienced and, I feel, objective participants, chaired by Hans L. Landsberg, who has written cogently on energy problems on numerous occasions. The study is voluminous, 608 pages, and is worthy of careful and detailed study, perhaps more than all but a few will find time to do. However, it is begun by a Preface and Overview that many should take time to study thoroughly. In fact, this succinct, persuasive portion of the report should be issued as a separate document and given much wider distribution than the total volume is likely to receive. The Overview presents tellingly the major conclusions and recommendations of the study along with the rationale therefor.

The report presents convincingly the fact that there are plenty of energy resources but that they are no longer inexpensive. Furthermore, it supports forcefully the thesis that the nation must increase its production of conventional resources for the remainder of this century to cover the time lag needed for the development of alternate sources. It suggests that in order to achieve this goal all price controls and other inhibiting regulations must be removed. Only as the nation pays the true costs of all energy production will real conservation be practiced and the incentive be provided to hasten development of feasible alternate sources of energy for an energy hungry people.

For every individual involved in energy policy, careful study of this report is a must. For anyone interested in understanding the nation's energy dilemma, this report provides a valuable primer.

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