or value for a person who has had an education in chemical engineering since he or she would consider the presentation of almost all the topics to be on an elementary level. On the other hand, the book was not intended for use by chemical engineers. It was written to help chemists become aware of what goes on in industry or perhaps it would be better to say it was written to teach chemists some chemical engineering. From this viewpoint, the book does an admirable job. It is clearly written, and the chemist or technologist would have no trouble in following the mathematics presented or the logic. It could serve as a text for a single course for chemists or technologists at the end of their education to familiarize them in general with chemical engineering and applications in industry. Some of the chapters have problems at the end for reader solution which are on a level of difficulty appropriate for this book.

On an overall basis, the book cannot be recommended to anyone with a chemical engineering background for anything except some general information and a chapter of details on the process for producing urea. However, it is well adapted for the use of its intended audience (chemists) and could be very helpful to them in showing what chemical engineering is and in helping them make the transition from the academic world to industry. □

FERMENTATION AND ENZYME TECHNOLOGY

By D. I. C. Wang, C. L. Cooney, A. L. Demain, P. Dunnill, A. E. Humhprey, and M. D. Lilly
John Wiley & Sons, New York, 1979, 374 pages, $25

Reviewed by Alden Emery
Purdue University

A fermentation technology summer course of one-week duration has been offered at M.I.T. for 5 years. One of the recent teams involved collaborated in the writing of this book, presumably transcribing the material of their lectures. The stated function of the book is to aid persons taking the summer course, both at the time of the course and later. A slant toward commercial interests is implied in the preface.

The chapters can be divided into three parts: microbiology, engineering, and enzymes. The microbiology part is almost all concerned with subjects of primary concern to the industry now. The engineering part is about half of immediate concern to industry; the other half ought to be, academics would argue, because it points the way to the future. The enzyme part is all pertinent, but of intermediate concern.

The writing in the beginning of the book is of high caliber, carefully organized, interestingly presented and with historical notes which heighten interest. The end of the book is equally good, expansive and carefully presented, if a little dry. The middle chapters unfortunately suffer from the ills of haste to such an extent that one wonders if there was any proofreading by the authors or editing by the publisher.

Anyone in industry thrust into the field could benefit by the organized explication of the major interests and approaches given in the book, if the enthusiastic review by Richard Myerly in S.I.M. News (p. 45, July 1979) is any indication. As an introduction and overview, this may be true. In terms of comprehension, however, engineers with no previous contact with biology will have trouble understanding the terms in the microbiology sections, since a background in biology is assumed; the metabolic regulation in Chapter 1, for instance, would not be intelligible without acquaintance with genetics. Persons without exposure to engineering may have problems with the philosophy, approach, and methods of the engineering sections, as a comprehension of mathematics and modelling equal to an upperclass engineer is implied in the presentations.

Academic chemical engineers will naturally

Continued on page 152.

ChE conferences

CHEMISTRY AND PROPERTIES OF POLYMERIC MATERIALS

October 2-4, 1981. Montreal, Canada

Short course on the state of the art on the chemistry and properties of polymeric materials. Lecturers include M. N. Bassim, R. B. Bird, D. De Kee, J. E. Mark, J. R. A. Pearson, M. V. Sefton and J. L. White. For further information: Dr. D. De Kee, ChE Dept., Univ. of Windsor; Windsor, Ontario, Canada N9B 3P4.

POLYMER SCIENCE AND TECHNOLOGY SYMPOSIUM

September 28-29, 1981. Houghton, MI

Details may be obtained by contacting W. M. Lee, Symposium Chairman, ChE Department, Michigan Technological University, Houghton, MI 49931.

TABLE 3
Relationship Between The DPI and Academic Support Personnel: All Engineering, 1978-79

Degree Productivity Index (DPI	No. of Schools	(Adj. Faculty + TA's/FTE)*
Below 3.00	2	0.45/0.51
3.00-3.99	13 (1-na)	0.66/0.70
4.00-4.99	20 (1-na)	0.80/0.82
5.00-5.99	20	0.90/0.96
6.00-6.99	11	1.01/1.06
7.00-7.99	9	1.10/1.15
8.00 & Over	4	1.34/1.42
Avg. = 5.40	79	Avg. = 0.89 (77 Schools)

*The second figure is the Group Average excluding the low number in the group.

The basic feature of Table 3 is not to deny that institutions with relatively large DPI's are not in need of additional FTE faculty, but simply to point out that a combination of a high DPI and a relatively low (Adj. Fac.-TA)/FTE ratio is a potentially disastrous situation. To cope with an increasing DPI requires increasing auxiliary academic support, as a minimum, in order to maintain program effectiveness and quality.

Unfortunately, the ASEE information does not present comparable data for TA's and adjunct faculty for individual engineering disciplines. However, the previous data relating the GTA's available for chemical engineering (1977-78) showing an average of 0.6 GTA/FTEF from budget funds and 0.95 supported from all resources would appear compatible with the above results.

There are some who feel the rapid growth of chemical engineering programs, in terms of student interest, exceeding that of engineering in general is reminiscent of the "boom-and-bust" phenomena affecting aerospace programs in the early 70's. I disagree with this as the primary base of the aerospace market relied on a singular industry type; in contrast, the growth in chemical engineering interests seems based on a broadening of the industry base utilizing chemical engineers. This is not to say there will not be a decreasing demand as the secondary school productivity decreases, but rather that chemical engineering as a professional engineering program will probably retain a larger percentage of the total engineering population.

The final question posed in the aforementioned survey of chemical engineering departments asked for a realistic assessment of program needs ranging from critical to generally satisfactory. In light of the above, the results were not surprising. 40.9% listed added faculty as a critical need, 36.4% listed operating and equipment monies as most critical; GTA's (10.2%), Space (6.8%) and Faculty Salaries (3.4%) were also-ran candidates insofar as being termed critical. Now that almost three years have passed since this original survey, perhaps a followup is in order to determine what improvement, if any, has resulted. □

FERMENTATION TECHNOLOGY

Continued from page 145.

wonder about the suitability of the book for a standard course. It may not be fair to comment on this use, since the preface, except for one expansive sentence, carefully delineates its intended use for the students of the M.I.T. summer course. But for this journal, a comment is required.

Compared to the textbooks on biochemical engineering now in use, the size is smaller, which one would expect since much less material can be transmitted in a one-week course. The texts in use assume no background in biology, and explain the fundamentals of microbiology and biochemistry fairly carefully; their major thrust is with generalizations, which they illustrate with some examples. Wang *et al.* spend no time on the basics but begin the discussions of microbiology at a more advanced level, which will be a problem to many. On the other hand, the presentation extends more into specifics and examples of current practice. Three chapters contain material which is not available in the current texts or elsewhere in one place; the chapters on secondary metabolites, bioconversions, and enzyme production.

The engineering topics of this book are almost all covered by the current texts, where they are developed more expansively. On the other hand, two chapters in this book have more content than is found in the other books; the chapters on continuous culture and enzyme isolation.

In summary, the abbreviated presentation of fundamentals, extended coverage of examples of commercial practice, and awareness of industrial needs will undoubtedly make the book valuable to persons in the industry. For the academic classroom, the book is probably not suitable as a primary text for introductory courses in biochemical engineering as they are now constituted, but would make a useful reference. □