fundamentals studied through the Center, the National Science Foundation will have achieved its goal of improvement of technological innovations, industry will have benefited with new products or improved systems, the student will clearly have benefited, and the Center will benefit as all parties will continue to support the Center.

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ChE book reviews

LIQUID FILTRATION
by Nicholas P. Cheremisinoff and David S. Azbel
Ann Arbor Science Publishers
Woburn, MA (1983) $49.95.

Reviewed by
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Most modern curricula in chemical engineering are dominated by attention to the process design applications of momentum, heat, and mass transfer with an increasing emphasis on computers. Many topics are superficially covered, and there is a significant probability that one or more of these topics can be of major concern after graduation. Liquid filtration is such a topic. For the engineer who encounters a solid fluid separation problem in the chemical, polymer, drug and cosmetic, steel, food and beverage, petroleum, or paper industries, this book on *Liquid Filtration* can provide a state-of-the-art review that can amplify the superficial coverage obtained as an undergraduate.

This industrially oriented review of liquid filtration in the chemical process and allied industries has chapters on the hydrodynamics of flow in porous media, cake filtration, media filtration, filter aids, filter media, cake washing, cake dewatering, optimizing filter design, and selection of filter equipment. Chapters written by specialists on ultra filtration (C. Gelman and R. E. Williams), membrane filtration (C. Gelman, H. Greene, and T. H. Meltzer), and reverse osmosis (P. N. Cheremisinoff and A. R. LaMendola), expand the coverage to liquid filtration of particulates from 1A° to 100 microns. The final chapter is devoted exclusively to example problems; for example, the comparison of filtration times for cylindrical and flat media, and the calculation of the filtration time for a specified quantity of filtrate. Under one cover, the reader gets a consistent set of notation and the essentials features of liquid filtration from a wide variety of sources.

The writing is clear and reflects the authors' industrial experience and approach to problem solving. The emphasis is on correlations and calculation procedures rather than mechanisms and analytical solutions. The mathematics is, at most, ordinary differential equations in time, but the major portion of the presentation uses relatively simple algebraic equations. Most of the references are prior to 1970 and a significant number are from the German and Russian literature. Some of these references may be inaccessible or, at least, difficult to obtain.

The introductory material on volume averaging is incongruous for this type of book and is inadequately presented. Many of the graphical correlations do not have references and this pre-

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polymer-solvent compatibility were individually adjusted. In addition, the effect of the rate of cooling following annealing (baking) was carefully examined. The analysis was based on the varying free volume fraction trapped in the glassy film upon cooling. Effects of physical aging below glass transition were also included. An ongoing experimental and theoretical project originated out of this effort. Non-isothermal polymerization in tubular reactors and CSTR's in series, rheology of fiber suspensions in polymeric matrices, and transient temperature profiles of local spots irradiated with laser pulses were additional examples, which led to certain past as well as current research activities.

Besides maturing into full-fledged research projects, major results of previous class efforts were disseminated in later offerings. Some problem statements were modified so that current students could build upon earlier findings and study unexplored features. Hence, although successive classes were handed revised sets of problems, the basic theme remained the same. One thing is certain. The course in polymer processing at Berkeley continues to evolve and yet remains a rewarding experience for the instructor.

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cludes examining them in more detail by referring to the original work.

After reading the book and observing the number of papers that have been written, it appears that a coherent filtration theory that connects the very practical aspects of filter media selection, predictive rather than reproductive filter design, and optimal operation has eluded this significant research effort on a unit operation that is common to a wide segment of the chemical process industries. □

ChE book reviews

MOMENTUM, HEAT, AND MASS TRANSFER
by C. O. Bennett and J. E. Myers
Third Edition, McGraw Hill, Inc. (1982), pp. 832

Reviewed by
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Pennsylvania State University

How should transfer operations be taught? The answer to this question determines the choice of textbooks for such a course. The unit operations approach was effectively advocated in a number of textbooks which appeared in the 1950s. This was in line with the earlier evolution of the subject area. The development of a unified transport theory profoundly affected the teaching of transport phenomena at the graduate level and also led to a critical evaluation of how transfer operations were being taught to undergraduates. As a consequence, textbooks emphasizing the fundamentals and providing a connection between transport theory and unit operations were conceived. One of the prominent outcomes was *Momentum, Heat, and Mass Transfer* by Bennett and Myers, first published in 1962.

The publication of the Third Edition of *Momentum, Heat, and Mass Transfer* is a measure of the favorable reception the book has received, since its first appearance, for its approach to teaching transport processes. The Third Edition of the book is essentially identical to the Second Edition. The principal change is the introduction of SI units in a larger number of problems. Further, in each chapter, two or three additional exercise problems have been introduced. However, the added problems are similar to those already existing and they provide an instructor with a larger quantity rather than a larger variety of problems to choose from.

Momentum, Heat, and Mass Transfer by Bennett and Myers is written primarily as a textbook. The material is arranged in three main sections dealing with the three transfer operations. The early chapters in each section deal with fundamental transport theory. Each section includes a discussion of relevant design equations

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