

Finally, the possibility of adding controllers to cause optimal oscillation of stable steady state processes is examined.

The author has provided problems with an indication of their level of difficulty. However, so few of them are designated as undergraduate that this book must be considered as a graduate text. The two volumes should be used in sequence with Volume 1 at either the undergraduate or graduate level.

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Dynamic Behavior of Processes, John C. Friedly, Prentice-Hall, Englewood Cliffs, N. J. (1972). 590 + xv pages. \$18.95.

This text by John C. Friedly is a surprisingly complete discussion of the principles of unsteady state behavior of chemical and related processes. Friedly has given a very complete and detailed exposition of the dynamics of chemical processes. This book is especially noteworthy for its many detailed examples of models for reactors, both continuous for stirred tank and batch tank, and distributed (packed bed and tubular) and for its major emphasis on distributed systems and their partial differential equation models. Likewise, a very thorough treatment is given of the methods of solution of the resulting sets of equations where they fit any of the systems which have analytical solutions or where approximations are possible. Also extensively treated are lumped and distributed models for distillation and the related separation processes.

This text uses fully the mathematical techniques of vector analysis and matrix notation to facilitate the development and the solution of complex models of ordinary and partial differential equations. Chapter 3, along with two appendices of the book, gives a 37-page review and tabulation of matrix, vector, and linear algebra techniques, as well as Laplace transform methods. This material is enough for reference or review but requires that the reader have experience with these techniques prior to attempting a thorough study of process dynamics as presented here.

While the book is somewhat larger than average, it is still relatively small for the large number of topics covered. Consequently, the material is covered at a quite high level in order to be thorough but brief. The result is a text which is really suited only for students with a high level of preparation. The

author in his Preface recommends his book for a typical graduate course in process dynamics, or for advanced and specialized courses in this area. As just mentioned, this reviewer would certainly support the use of this book for a second or advanced level graduate course in the area of process dynamics.

In view of the specialized nature and very high level of this text, this reviewer would not endorse it even with extensive supplementary material for a course in process control (presumably at the graduate level) or for a senior course in process dynamics and control. There are too many excellent process control tests available today which cover both dynamics and control at a lower technical level and in a much more detailed fashion. Certainly, one or the other of these should be used for such purposes.

In summary, this is a very valuable reference book for those with the background to use it and an excellent text for the advanced student.

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Gas Chromatography, L. Szepešy, Chemical Rubber Co., Cleveland, Ohio (1972). 384 pages, \$26.50.

The gas chromatograph is probably the analytical instrument with which a chemical engineer is most likely to become involved. This book by L. Szepešy, a chemical engineer himself, is well designed to acquaint those having little or no experience in gas chromatography with the fundamentals, equipment, and techniques of this constantly expanding field. It is a well organized and very readable book, although the translation is occasionally awkward.

In the first sections of the book dealing with the theory and fundamentals of gas chromatography, many of the familiar equations of mass transfer, fluid flow, and phase equilibria are in evidence. Refraining from including derivations, the author has simply presented the more important equations and correlations accompanied by discussions of their relative value and applicability.

The chapter on equipment is quite complete with descriptions of the major types of the various components which make up gas chromatographic systems. The advantages and uses of each type of equipment are presented clearly and concisely.

The varieties of columns, packings,

operating techniques, and the treatment of data are adequately discussed. Information about conditions for specific analyses are not given in the book. Instead, the author has chosen to present tables containing references on the analyses of the more important groups of compounds, both liquids and gases. Most of these references are to English language journals, and there are several given for each group of compounds.

Two short chapters on preparative and process gas chromatography are also included. There is an extensive bibliography of over 1100 references, and the index is very complete.

While there is nothing new or unique in this book, those inexperienced in the field of gas chromatography will find it a very useful and informative text. The price, however, may limit its attractiveness for many.

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Chemical Reaction Engineering, Advances in Chemistry Series 109, American Chemical Society, Washington, D. C. (1972) \$16.50.

This book represents the proceedings of the First International Symposium on Chemical Reaction Engineering held in Washington, D.C. in June, 1970. Although titled "First International", the Symposium was an outgrowth of the previous four European symposia; the first held in 1957. Many feel that these symposia defined, in essence, the broad field of chemical reaction engineering. A wide range of topics is represented and both fundamental and applied papers are included. There are papers dealing with fixed bed reactors, polymerization kinetics and reactor design, fluidized bed reactors, optimization of reactor performance, physical phenomena and catalysis in gas-solid surface reactions, two-phase and slurry reactors, catalyst deactivation, industrial process kinetics and parameter estimation, stability, control and transient operations, and biochemical reactions.

In each subject area (10) is an authoritative review of the state of the art by an international expert, followed by extended summaries of the research papers. This structure provides the reader with a current, general survey of each area, as well as details of the latest research. Care was taken to ensure that session chairman and authors represented both the United States and

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