BOOKS

Chemical Engineering Kinetics. J. M. Smith. McGraw-Hill Book Company, Inc., New York (1956). 402 pages. $8.00.

Professor Smith has attempted to fill a great need in chemical engineering text books by writing an introductory work on chemical engineering kinetics. The work is eminently suitable for senior-level instruction since no mathematics more advanced than undergraduate calculus need be used in Smith's problems. At times, however, this results in extremely long and tedious calculations. Fundamentally the text is devoted to the problems of designing or sizing equipment, as may be seen by these sample chapter headings: "Introduction to Reactor Design," "Homogeneous Batch Reactors," and "Design of Gas-solid Catalytic Reactors." The material in this work is presented very much in the same form as Smith's earlier well-known book on thermodynamics: generally clear explanatory text followed by worked illustrations of the principles discussed. There are extensive and challenging problems at the end of each chapter which should prove useful to all those who teach kinetics. As in an earlier work on chemical engineering kinetics, Smith, although relying heavily upon his own papers in finding examples, fortunately includes a large body of other works augmented by extensive references.

After a useful review of the thermodynamics of chemical equilibrium the general field of kinetics is introduced in the third chapter. However the summary of the absolute rate theory included in the appendix at best serves as a review for those previously acquainted with statistical mechanics. The practical demands of reactor design are then fairly well presented in the fourth chapter. Homogeneous reactions are the subjects of the fifth and sixth chapters, and semibatch or continuous stirred tank reactors are adequately discussed in the seventh chapter. A discussion of catalysis in the eighth chapter serves as an introduction to heterogeneous reactions, the subject matter for the remainder of the book. The Hougen and Watson approach is used to derive rate equations for heterogeneous reactions in the ninth chapter. The tenth chapter covers heat and mass transfer in packed beds; here one might wish that the author dwelt more on *techniques* rather than *examples*. A brief discussion of the concepts used in setting up partial-differential equations and the solution to finite-difference equations would have been particularly useful to the student. Further, the appendix to this chapter discussing the Argo and Smith paper might well have been eliminated. Given the limitations of the tenth chapter, the final chapter, "Design of Gas-solid Catalytic Reactors," combines the material discussed in the last half of the book quite well.

Chemical Engineering Kinetics is a successful attempt to write an introductory text to engineering kinetics. As the field is growing quite rapidly, most teachers probably will choose to supplement it with material of their own. With the increased popularity of computing machines and more sophisticated mathematical methods the last few chapters of the book may have to be rewritten.

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