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BOOK REVIEW

Handbook of Heat and Mass Transfer, Vol. 3: Catalysis, Kinetics, and Reactor Engineering (Edited by Nicholas P. Cheremisinoff). Gulf, Houston, Tex. (1989). 1470 pp. $195.00

Volume 3 is essentially a collection of papers from 67 authors and co-authors and is divided into three major sections with each section having a number of chapters for a total of 36 chapters. The major topics addressed include catalyst technology in Section I (8 chapters), multiphase reactor operations in Section II (14 chapters) and advanced methods of systems analysis in Section III (14 chapters). Section I emphasizes solid catalyst systems including characterization and properties, activity optimization, selectivity, catalyst technology in petroleum and coal processing, and modern experimental techniques. Section II covers reactor design, scale-up criteria and operational characteristics of the most common reactor configurations. Special topics such as photoreactors and bioreactors are also treated along with preparative and continuous gas–liquid chromatography. Finally, Section III addresses mainly reactor sensitivity and operational control using primarily linear methods. Also, several chapters cover computer-aided design of reactors, including controller design as well as fault diagnosis. Two additional volumes on multiphase reactor operations and design are in the works for this series along with a volume on combustion science and technology.

Volume 3 contains a wide spectrum of fundamental, experimental and applied approaches to the chosen topics. The depth of treatment, including the mathematical sophistication, varies considerably but, in general, is satisfactory. To illustrate the variation, Chapter 10 on heat transfer in packed beds is perhaps the most focused and elegant mathematical modelling effort in the entire volume and probably many practicing engineers and scientists would have difficulty in plowing through it. On the other hand, Chapter 11 on modelling of fluidized bed reactors is quite broad and descriptive and contains essentially no mathematical modelling but does contain an extensive and relatively current reference section for further inquiry. Chapter 5 on catalytic cracking of heavy oils is quite applied.

Although obviously restricted in his choices, the Editor, in general, has done a good job of selecting topics for inclusion in Volume 3 since most of them have important industrial applications. Thus, the volume is quite suitable for use mainly by industrial practitioners and perhaps even as a substantial reference for students.

The fact, that the Editor chose to draw upon the international community of scholars for contributions to Volume 3, has provided a broad spectrum of viewpoints and emphases. This clearly adds to its usefulness. The authors of most of the chapters have made good use of diagrams and graphical presentations of experimental and/or simulation results as well as correlations. In addition, most of the authors have summarized reasonably well the state of the art in their subject areas.

Overall, Volume 3 is a valuable addition to this series of handbooks on heat and mass transfer.

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