Book Reviews *

Comprehensive Chemical Kinetics. Volume 32. Kinetic Models of Catalytic Reactions. By G. S. Yablonskii (Siberian Branch of the USSR Academy of Sciences, Kysyl), V. I. Bykov and A. N. Gorban' (Siberian Branch of the USSR Academy of Sciences, Krasnoyarsk), and V. I. Elokhin (Siberian Branch of the USSR Academy of Sciences, Novosibirsk). Edited by R. G. Compton (Oxford University). Elsevier: Amsterdam. 1991. xiv + 396 pp. $237.00. ISBN 0-444-88802-0.

The authors of this book are mathematicians and chemists who are affiliated with the Siberian Branch of the Academy of Sciences of the former USSR. This text represents the culmination of a 15-year collaboration. The unifying interests of the authors and the unifying theme of the book concern the complex dynamics of catalytic reactions. The authors have presented a self-contained and very readable account of this subject. In the first chapter, a brief review of linear algebra and ordinary differential equations is presented, with applications to chemical catalysis. A fine discussion of the basic concepts of chemical kinetics, as applied to catalysis, is given in the second chapter. Then, in the remaining six chapters, the authors apply this machinery in a very logical (and I would even say elegant) way to the mathematical modeling of heterogeneous catalysis. Throughout the book, two levels of "kinetic analyses" are presented: one which might be termed "elementary" and which is aimed at consistency tests of proposed reaction mechanisms, and a second which might be termed "phenomenological" and which is conducive for math-

ematical modeling for reactor design, for example.

In order to give the reader a flavor, the topics include steady- and unsteady-state reactions, limit cycles and multiplicities of steady states, oscillations, kinetic phase transitions, slow relaxation (critical retardation effects), graph theory, and lattice gas models of surfaces. There are numerous helpful and well-chosen examples. Indeed, one chapter (Chapter 6) is devoted to an excellent analysis of the carbon monoxide oxidation reaction. The book is extremely well referenced (at least through about 1986), and it provides access to Russian references that are not otherwise very well known, as well as more familiar Western publications. To top it all off, there is also a very nice "history" of the scientific subject matter.

In summary, this book can be recommended highly. A major strength is that it will bring chemistry to chemical reaction engineers, and it will bring mathematical analysis to catalytic chemists. It could be effectively used as a text in a graduate course on chemical reaction engineering in a chemical engineering curriculum.

W. Henry Weinberg, *University of California, Santa Barbara*