

BOOK REVIEWS

C. N. SATTERFIELD, **Mass Transfer in Heterogeneous Catalysis**. M.I.T. Press, 1970, 267 pp., \$14.25.

ALTHOUGH there is some connection between this text and "The Role of Diffusion in Catalysis" by Satterfield and Sherwood, it would be unfair to the author to regard the present volume as a second edition of the earlier book. Not only has additional material been added to more than double the content, but, in addition, the progress in the field of heterogeneous catalysis necessitated substantial revision of the existing chapters.

The book starts with a phenomenological discussion of the possible kinetic regimes in the interaction of mass transfer and a gas-phase reaction occurring in a porous solid catalyst. This is followed by a discussion of diffusion in gases and liquids and of the various modes of diffusion in catalyst pores. Short accounts on characterisation of catalyst particles and methods of estimating pore diffusion coefficients are also included. The chapter on diffusion is followed by what is essentially a literature review on mass transfer in fixed bed, trickle bed, fluidized bed, bubble and slurry reactors. The remaining two chapters are more theoretical in character. The first of them deals with the theory of simultaneous diffusion and reaction and the concept of the effectiveness factor. The treatment is kept relatively simple, free from involved mathematical derivations. The more difficult cases such as non-isothermal conditions, more complex kinetics and presence of volume changes are treated in the last chapter. Problems of selectivity and catalyst poisoning are also dealt with at this stage. No detailed mathematical analysis is attempted and results are usually presented in a graphical form with frequent references to practical problems. This tendency is the dominant feature of the book. As a result it is readable and useful to all workers in the field. An exhaustive bibliography (396 references) is an additional recommendation. Although the subject matter is treated from the chemical engineering point of view, nevertheless, or perhaps because of it, it should

prove valuable not only to chemical and process engineers but also to chemists.

H. SAWISTOWSKI

Turbulent Jets of Air, Plasma and Real Gas, Edited by G. N. ABRAMOVICH. Translated from Russian, and published by Consultants Bureau, New York, 1969.

THIS book of 144 pages contains six articles, of which the titles and authors are:- High temperature turbulent jets by V. A. Golubev; The calculation of turbulent jets of real gases by V. I. Bakulev; The calculation of the shape of an isobaric mixing chamber, by O. V. Yakovlevskii; The propagation of a turbulent jet in an opposing stream, by A. N. Sekundov; Axially symmetric supersonic turbulent jets discharged from a nozzle with underexpansion, by Chiang Che-haing; and Turbulent submerged jets of real gases, by G. N. Abramovich, V. I. Bakulev, I. S. Makarov and B. G. Khudenko.

The value of the papers for Western readers lies in the view that they give of the state of Soviet expertise in this field in 1967 (the date of the original publication), and in a few new pieces of experimental information. The theoretical methods are not likely to be used, for two reasons. Firstly, their physical models are ill-balanced, being rather elaborate on the thermodynamic side, but primitive in respect of hypotheses about turbulence; thus the Prandtl mixing-length model underlies much of the work. Secondly, the differential equations are solved in these papers only in similarity form, and by rather unwieldy analytical methods; recent developments in numerical methods for solving parabolic differential equations have rendered such treatments rather obsolete.

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