BOOKS

Flow Through Porous Media, Proceedings of the Sixth State of the Art Symposium sponsored by Industrial and Engineering Chemistry, Washington, D. C., June 9-11, 1969. American Chemical Society, Columbus, Ohio. 248 pages. $9.00.

All papers contained in this book were published in *Industrial and Engineering Chemistry* between October, 1969, and October, 1970; nevertheless, it is useful to bring them together primarily as a reference aid to current literature for researchers in the area. The papers are review papers written by both academic and industrial investigators dealing with many topics of current interest involving flow phenomena in porous media. Concerned primarily with the basic phenomena of flow rather than with specific applications, the studies, are of broad interest. Because the book contains over 1,000 literature references, it is a good starting point for anyone beginning a study of the subject.

The first paper of the volume, by F. A. L. Dullien and V. K. Batra, is a good introduction to the collection since it readily shows the extremely complex structural factors present in porous media. It discusses various models used to represent the complex geometry occurring in porous media and provides a valuable comparison of various methods for determining pore-size distribution, such as mercury porosimetry, sieve analysis, photomicrographic methods, gas adsorption, and several less common techniques.

In a more theoretical light, S. Whitaker presents a development based upon volume averaging the local equations of steady, incompressible, creep flow to yield Darcy's Law. Professor Whitaker's analysis showing the symmetry of the permeability tensor is of particular note, as this point has been the subject of considerable investigation.

A comprehensive literature review on non-Newtonian flow in porous media is given by J. G. Savins of Mobil Research and Development Corporation. The capillaric model for a porous medium is used to obtain a generalized flow equation for fluids having arbitrary rheological behavior, of which the simple power-law and Ellis models are special cases. Numerous comparisons between experimental data and model predictions allow the reader to judge the current state-of-the-art in this important area.

The voluminous literature in the dispersion area is well summarized in two papers by Greenkorn and Kessler and by Nunge and Gill. The former investigators compare the statistical approach to dispersion with the continuum viewpoint, while the latter authors review elementary mechanisms causing dispersion on a local scale.

Other major contributions to this book discuss the experimental methods for determining anisotropic permeability, the prediction of diffusional fluxes in porous media, the clogging of deep bed filters by suspended particles, a theoretical framework for viewing the coalescence of immiscible fluids in porous media, and a thermodynamic theory for the capillary effects accompanying the immiscible displacement of interstitial fluids from a porous solid. Of interest to chemical engineers is a paper treating reverse osmosis as a unit operation.

As a whole, the papers are of high quality and interest to a great number of investigators in the porous media field. Their usefulness is enhanced by a unified index of the subject matter. In conclusion, this book is a valuable reference source and guide to the literature for scientists studying flow phenomena in porous media.

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Processes and Systems in Industrial Chemistry Herman P. Meissner, International Series Prentice-Hall, Englewood Cliffs, N.J. (1971). 386 pages. $13.95.

This text appears to be an excellent teaching tool—the purpose for which it was designed. It should help bridge the gap from the theoretical to the real, live world of the process industry.

Meissner's basic approach is to briefly review those aspects of equilibria in reactions involving homogeneous, heterogeneous, and liquid-solid systems; material and heat flow as it applies to industrial processes; homogeneous, heterogeneous, and catalytic reaction rates; and electrochemical operations. In the text portion of the book, he draws on industrial examples to illustrate the problem-solving methods proposed and the intellectual approach to a problem situation. From these the student should begin to get the feel for using academically acquired tools plus analytical thinking to solve industrial process and design problems.

The text section is followed by 137 pages of problems drawn from industrial processes, with most of them taken directly from published articles or books. The author points out that those interested can get further information from the 167 references cited. For professors who want to expose their students to the application of theory, the text can be used as a course-expanding source. Or, obviously, a professor could successfully build a separate course around the book.

In summary, since most chemical engineers enter industry where imaginative solutions to practical problems are required, a course or course supplement built around this book should be beneficial. To quote the author, an industrial chemist or process engineer is normally trained in chemistry or chemical engineering, "but his success in the field is dependent not so much on background as on his resourcefulness, ingenuity, and capacity to improvise and invent." Meissner's book provides a good introduction to this type of thinking.

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