

BOOKS

Heat and Mass Transfer in Packed Beds, N. Wakao and S. Kaguei, Gordon and Breach Science Publishers, 1983, 364 pages.

This monograph represents the study over several decades by Professor Wakao and his colleagues at the University of Yokohama and the University of Tokyo. There are eight chapters concerned with various aspects of heat and mass transfer in packed beds. Of the six possible transport processes, one each for heat and mass transfer, the book includes intraparticle mass transfer but not heat transfer, interparticle heat and mass transfer, and dispersion of mass and heat in the intrareactor space. Each of these five transport processes is considered in some detail with ample references to developments over the past 20 years.

A useful feature of the book is that it includes a summary, not heretofore seen in the literature, of dynamic methods for studying heat and mass transfer in packed beds. Various types of moment methods, analysis in the Laplace domain, Fourier analysis, and curve fitting in the real time domain are considered in sufficient detail for students to use the methods. The hazards in attempting to evaluate more than one transport coefficient from a single run are emphasized. Considerable emphasis is placed on the superiority of curvefitting in the real time domain as far as accuracy of parameter determination is concerned. However, little attention is given to the advantages of some of the other methods of analysis; for example, the value of the moment method in showing clearly and distinctly the effects of operating variables on the transport coefficients, something that can not be obtained by curvefitting in the real time domain. Each transport process is considered by summarizing prior studies both of a steady-state and dynamic nature.

This book should be of considerable value to researchers concerned with transport processes in packed beds, particularly the application of dynamic methods for such studies.

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Electrochemistry in Industry: New Directions
edited by Uziel Landau, Ernest Yeager, and Diane Korta
Plenum Press, 1982, 388 pages \$49.50

This book contains the proceedings of a conference held at Case-Western Reserve University on October 20–22, 1980. All the papers presented were invited, and the authors were to discuss new developments and their expectations for the future in industrial applications of electrochemistry. Most authors give some background material as well as reviewing current research. The discussions, except for a few, are mainly qualitative without much mathematical development. Most authors give extensive lists of timely references.

The book makes fascinating reading for a person who knows something about electrochemistry but may not be up-to-date on the recent developments. A person not familiar with electrochemistry would have difficulty with some of the papers but would find others interesting and easy to read. Some of the highlights of the book are as follows.

H. B. Beer presents an interesting first person account of his inventions related to dimensionally stable electrodes. This is useful information for prospective inventors. E. Yeagers gives an extensive review of mechanisms for oxygen reduction and about the prospects for replacing the hydrogen electrode in chlor-alkali processing. F. Goodridge presents a good discussion of the pitfalls of using $j_D(N_{Re})$ correlations in designing and scaling-up fluidized bed cells. W. Grot summarizes DuPont "Nafion" membrane properties with good references to patents. Applications of membranes in several fields in addition to chlor-alkali processing are discussed. M. M. Baizer gives excellent guidelines for rational development of processes involving electrochemical synthesis. E. J. Cairns offers a comprehensive review of battery systems for automobiles but gives few references. He has an interesting analysis of energy use in the United States. W. Vielstich presents a similar analysis for European developments in outlook toward transportation between Europe and North America—trac-

tion versus automobiles. J. O'M. Bockris gives a discussion of his own work related to photochemical water splitting. His article seems to have political overtones. Legislators are not likely to read this book, so the style seems out of place. A. Heller presents an exhaustive discussion of the historical development of photoanodes. R. P. Frankenthal gives some up-to-date references about the economic effects of corrosion. J. Krueger writes in depth about passivity and the mechanisms for passivity breakdown. There is a lot of quantitative information in his paper. T. R. Beck gives an excellent review of the Hall process for aluminum smelting, but seems to neglect Japanese developments related to the Soderberg electrode. His paper deals mainly with the development of dimensionally stable anodes and drained cathodes.

There are, of course, many other papers not mentioned. Another reviewer might have highlighted different items.

The authors almost all neglect to make predictions about future trends related to their topics. The final section is a transcript of a panel discussion devoted to future trends in industry. Nearly all the interesting predictions are contained there. J. C. Cole makes some remarks about government regulation related to chio-alkali processing using mercury or asbestos and about government regulation of chlorine transportation. He believes that membrane cells will be used with increasing frequency for new plants and that chlorine production facilities will be located at the point of use. N. Jarrett gives an authoritative discussion of technical and economic aspects of the aluminum industry. He writes in an optimistic fashion about where he believes future development efforts will be most fruitful.

The book makes good reading as a review of current thinking on a wide variety of topics related to electrochemical processing. It is especially interesting to see the different points of view and different writing styles of the several authors.

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