

## BOOK REVIEWS

### **Synthetic Membrane Processes: Fundamentals and Water Applications, a monograph on water pollution**

Edited by Georges Belfort, Academic Press, 1984, 552 pp.

Chapters 2 through 6 make a good summary of the theory of membrane transport through reverse osmosis, ultrafiltration, and electrodialysis membranes, and discuss some of the issues in modeling devices using the membranes. This section is particularly useful in a textbook sense for teaching principles to chemical engineers. Chapters 7 through 13 provide a series of case studies based on water and wastewater treatment. A large body of practical information is provided (such as cleaning and pretreatment methods).

There seems to be relatively little connection between the two parts (Chapters 2-6, and 7-13) of the book, perhaps because of the number of authors involved (14 within the U.S., 9 outside the U.S.). The theory presented in Chapters 2 through 6 does not always find illustration or application in the latter chapters.

Ultrafiltration as applied to macromolecular (biopolymer) separations and purification is not covered at all. Nor are membrane processes for gas separation or enrichment. Water is the product of central focus.

The list of references is extensive, up to date, and broad, reflecting the international background of the contributors.

Edward W. Merrill

Dept. of Chemical Engineering  
Massachusetts Institute of Technology  
Cambridge, MA 02139

### **Fluidization '85: Science and Technology**

Edited by Mooson Kwauk and Daizo Kunii, Science Press, Beijing, China; Elsevier, Amsterdam, 1985, 488 pp.

This is a collection of forty contributed papers, three invited papers, and two overviews presented at the Second China-Japan Symposium on Fluidization, Kuming, China (April 10-15, 1985). The coverage of the field is wide, as can be seen from the titles of the sections into which papers are grouped, namely Flow-1

(Bubbling Beds), Flow-2 (Others), Liquid-Solid and Three-Phase, Combustion and Gasification, Catalysis and Solid Processing, Modeling, Mass and Heat Transfer, and Measurement.

Many of the papers reflect concerns common to most workers in the field—bubble properties, gas exchange between bubbles and the emulsion phase, the transition to slugging, the influence of distributor design, etc. However, particularly interesting are a few contributions that describe less conventional fluidized systems, such as the vibro-inclined fluidized bed, the jigged bed reactor, and multi-stage fluidized beds of various types. There is a strong set of papers on liquid fluidized and three phase beds, but a curious lack of papers on particle transport, with the exception of a review on standpipe flow from a western source, which is listed but not reproduced.

One of the more interesting contributions is the overview "Challenges in Fluidization," by Kwauk and two co-workers, which provides an excellent survey of areas where research is still needed and urges more attention to situations other than the conventional bubbling fluidized bed.

The reviewer believes that the frequency with which symposia on fluidization are currently held is far too great, with the consequence that only a small proportion of contributed papers contain much of value. By comparison with other recent symposia, the present one is better than average in this respect, so there is something to be said for making space on a bookshelf for this collection.

Roy Jackson

Department of Chemical Engineering  
Princeton University  
Princeton, NJ 08544

### **Adsorption and Catalysis on Oxide Surfaces**

Edited by M. Che and G. C. Bond, Elsevier, 1985, 442 pp., \$94.50.

This volume contains the proceedings of a symposium held to commemorate Dr. A. J. Tench, who made major contributions to the knowledge of the structure, reactivity and adsorption properties of ox-

ide surfaces. It has succeeded in bringing together, as authors of the various chapters, the major practitioners in the field of oxide characterization, surface and bulk, and catalysis of oxide surfaces. As a result, the volume contains an up-to-date review of the state of oxide surface science characterization and several papers on catalysis over oxide surfaces.

Most researchers in the field of surface science and catalysis concentrate on metal surfaces. The surface science and catalysis of metals have been highly developed and many high-technology catalysts were developed from this knowledge base. The studies of oxide surfaces are not so well developed. This particularly brings into focus the importance of such a volume that concentrates on the developing science of these catalytic materials. The volume represents research that is state-of-the-art. Many of the papers discuss the use of various techniques. A combination of these techniques for the characterization of oxide, bulk and surface, point out the difficulties of such studies and the interpretation of their results. Over half of the papers deal with characterization and do not mention catalytic studies. However, the other papers clearly show the unique catalytic properties of oxide surfaces for partial oxidation and also for the production of alcohol from carbon monoxide and hydrogen. In this respect, the catalytically important materials are the focus of these studies. These include molybdenum oxide, vanadium oxide, magnesium oxide, and the important alumina silicate molecular sieves.

At this stage of development of oxide structural and catalytic chemistry, there are no overriding principles that could be used to focus the work at present and extrapolate to the future. The results are scattered and the book clearly reflects this fact. However, each chapter is written by an authority in the field, and professionals working in the area would find it particularly useful because of its state-of-the-art account of the understanding of the structure and adsorption characteristic of oxide surfaces. In some cases, these physical properties are related to catalytic activity. The book will make an excellent addition to the library of sci-