BOOKS

Diffusion: Mass Transfer in Fluid Systems by E. L. Cussler, Cambridge University Press, 1984, 525 pp., $49.50.

This book contains material that can be taught at both the senior undergraduate and graduate levels. Some chapters are suitable for engineers in industry and a few chapters could be of interest to biologists, physicians and chemists.

The author points out that diffusion is always perceived as a difficult subject. However, since the author is a well recognized researcher in diffusion, it is not surprising that his style in writing and down-to-earth approach makes the book appealing to the reader.

The book begins with a short chapter, Chapter 1, which is concerned with the basic models for diffusion. Following that, the book is divided into four parts.

Part I (Chapters 2–4) deals with the fundamentals of diffusion. Diffusion in dilute and concentrated solutions is presented in Chapters 2 and 3, respectively. Chapter 4 deals with dispersion concisely.

Part II (Chapters 5–8) deals with diffusion coefficients. In Chapter 5 the author treats diffusion in gases, liquids, solids and polymers. Then the methods of measuring diffusivities are quickly reviewed. However, the author did not present as good a review of those methods as the one he presented earlier in his book on multicomponent diffusion. Chapter 6 is concerned with diffusion in electrolytic and associating systems; Chapter 7, solute-solvent and solute boundary interactions; and Chapter 8, multicomponent diffusion. In Part II, one would have expected the citation of the extensive contributions of researchers such as Babb and coworkers and Dullien and coworkers, but unfortunately the author failed to do that. Also, Cullinan and coworkers, who made significant contributions to this area, were cited only once. The most recent reference cited in the case of the diaphragm cell is dated 1974. The author did not refer to the works of Asfour and Dullien, published in 1983, which provided an improved diaphragm cell design, a new equation and more reliable calibration technique.

Part III (Chapters 9–12) is concerned with the fundamentals of mass transfer, absorption and distillation, and forced and free convection. The author approaches these subjects in a very easy-to-follow and clear manner.

Part IV (Chapters 13–17) is reserved for coupling diffusion with other processes; e.g., heterogeneous, homogeneous chemical reactions, membranes, heat transfer, and simultaneous heat and mass transfer.

The book also contains a fair number of solved examples and problems (many with final answers) that help clarify the various concepts brought forward by the author. However, the book lacks an author index.

Finally, the author has succeeded in presenting a difficult subject in an attractive manner.

A. A. ASFOUR
Dept. of Chemical Engineering
University of Windsor
Windsor, Ontario, Canada
N9B 3P4

Deactivation of Catalysts by R. Hughes, Academic Press (London), June 1984; 265 pp., $42.00.

This is a monograph on catalyst deactivation. The purpose, as stated by the author, is to bring together the information accumulated in the literature as a more cohesive whole and to address the problem of the loss of activity due to the catalyst deactivation. After a brief introduction of catalyst deactivation in general, a diffusion-deactivation problem is treated. This is followed by separate treatments of sintering, poisoning, and fouling. Deactivation in catalytic reactors along with the optimization of such reactors is then considered. Considerable attention is paid to catalyst regeneration at the end.

The monograph would be a nice reference to have in anybody's bookshelf who is interested in getting abreast of the subject matter. The attempt by the author to relate physics and chemistry to quantitative descriptions to the extent possible is notable. The discussion of catalyst deactivation through specific examples for various catalysts should be useful. The chapter on regeneration of deactivated catalysts is rather complete by itself and is perhaps the best chapter in the book.

The attempt to bring together the diverse deactivation phenomena and the diverse approaches taken is by no means an easy task. Because of this difficulty and the diversity involved, some might feel that the subjects of poisoning and fouling could have been treated more extensively and rigorously, beyond the level presented in the book. Some might feel the same for the reactors affected by catalyst deactivation. The subject of sintering could have been pursued further for a relationship for the surface area change in the case of atom migration. Compared to the other subject matters, the subject of diffusion-deactivation is treated rather lightly. Some could be confused by the use of the notation R^* in the pellet conservation equations and the definition of effectiveness factor (pp. 38–39). It could be a simple typographical error, but a clarification would be helpful.

The author should be congratulated for his attempt to bring together the diverse deactivation phenomena as a cohesive whole.

HONG H. LEE
Dept. of Chemical Engineering
University of Florida
Gainesville, FL 32611

Principles of Adsorption & Adsorption Processes, by D. M. Ruthven, John Wiley & Sons, 1984, xxiv + 433 pp.

At a time at which the search is on for less energy-consuming alternatives to distillation, adsorption has received increased attention as an industrial separation method. All the more welcome is a book covering fundamentals of adsorption and its application in industrial practice, especially if written by one of the leading experts in the field.

Ruthven's book is unusual in that it combines physical chemistry and chemical engineering of its subject and so brings together in a self-consistent treatment two facets which traditionally have been far apart. Its