

membrane field that may equal or surpass simple membrane separation processes in economic importance by 1990. Unfortunately, an area not included in Chapter 3 involves barrier polymer films and smart barriers that can pass one component (eg. CO₂) while minimizing the passage of another (eg. O₂).

Compared to the first edition, the expanded second edition includes more detailed discussions of the principles controlling the various membrane separation techniques. Division of processes into concentration-driven, electrically-driven and pressure-driven categories is used to structure the discussion. Basic requirements and properties of membranes for each of these areas are clearly delineated. Properties of biological membranes, not treated in the original edition of the book, are described concisely in a separate chapter of the new edition. As in the other nine chapters of the book, the treatment of biological membranes and discussions of membrane formation processes and characterization of membrane properties are simple and written in clear understandable language that will not intimidate the uninitiated. Good up-to-date references are provided for the reader who is interested in delving deeper into the topic. Good summary discussions supported by a useful number of references characterize the treatments and make the book a recommended addition to the collection of anyone active or interested in becoming active in the membrane field.

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Economic Methods for Multipollutant Analysis and Evaluation

By W. D. Baasel, Marcel Dekker, Inc., Pollution Engineering and Technology: A Series of Reference Books and Textbooks, Vol. 25, 1985, \$65.00.

This text presents the Multimedia Environmental Assessment System developed by the Industrial Environmental Research Laboratory of the United States Environmental Protection Agency. The Multimedia Environmental Assessment System is designed to provide an economic and systematic screening tool for defining the potential hazard associated with polluted discharges to the air, water and soil. Unlike the typical approaches to

defining risk that focus on the effects of single contaminants, this assessment method attempts to evaluate risks associated with multiple contaminants introduced into the environment by several paths. It is an attempt to address the problems associated with some of the overly narrow pollution control attempts of the past that have resulted in exacerbation of related pollution problems.

As with any simple method, however, it is subject to its share of criticisms. Particularly simplistic is the assumption of additivity of hazard associated with mixtures of pollutants when information to the contrary is unavailable. In addition, much of the method is simply the renaming of familiar measures of risk, such as threshold limit value, and the definition of new risk measures such as severity, which is simply the ratio of observed to desired concentration levels.

Regardless of the merits of the particular assessment system, however, it is an honest attempt to address the multipollutant, multimedia environmental problems that face the world today. He begins with an example of the pollution associated with a coal fired power plant and clearly demonstrates the need for simultaneous consideration of the risks associated with all discharges rather than approaching pollutants one at a time. The author provides an overview of the assessment process and follows this with chapters dealing with the details of each phase of this process. Throughout these chapters the author refers to concrete examples with tables of data appropriate for the examples. In addition, an extensive appendix is provided that summarizes desired concentrations (i.e. the multimedia environmental goals that are at the heart of the assessment system).

Other than my own hesitation to embrace the described assessment procedures, my main problem with the text was uncertainty over its readership. It seems aimed at a survey course in environmental assessment, and like most survey courses, it does not really prepare the reader to do anything. The preface suggests that the book will prove useful in the preparation of environmental impact statements but I think it is probably too general to be of much use in such an exercise. In addition, the author was forced to choose an almost uncomfortable balance between detail and generality. For example, the three paragraph discussion of gas

chromatography in the chapter on chemical analyses is unlikely to impart much understanding to a person who knows nothing about the technique but is equally unlikely to be of much use to one who does.

However, the text does provide an overview of the current practice of multimedia environmental assessment to the reader. I found the book useful in that it reminded me of the important environmental decisions that must be made based upon incomplete and sketchy data and often seemingly arbitrary analysis techniques.

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Spray Drying Handbook, Fourth Edition

By K. Masters, Halstead Press, New York, 1985, 696 pp.

Since the appearance of the First Edition in 1972, Keith Masters' tome on spray drying has been the standard first reference consulted by practitioners in the field. With the Third Edition (1979), it became known as a Handbook, which is certainly an appropriate description.

The book gives primary emphasis to three areas. The first of these is description and selection criteria for equipment. The second is discussion of atomizers and atomizer characteristics, including analysis of drop-size distributions. The third is a listing and discussion of the many different product applications. The presentations on atomizers, drop-size characteristics, and equipment are probably the most comprehensive available. The coverage of products is good but somewhat uneven. For example, within the foods area there is much discussion of spray-dried milk products, but only 2½ pages cover instant coffee, which is a major product.

The Fourth Edition is not much different from the Third. Only one new subsection has been added (Equipment to Agglomerate Spray Dryer Fines). The figures are essentially the same. The list of references is exactly the same, with the result that there is, very unfortunately, no reference more recent than 1978. How little can one change in a book and still call it a new edition?

There is a good amount of current research in spray drying, as becomes