

BOOKS

Water and Water Pollution Handbook Vol. IV, Leonard L. Ciaccio, (Ed.), Marcel Dekker, Inc., New York (1973). 630 pages. \$29.50.

This is the fourth and last volume in a series which covers most aspects of water pollution. The appearance of the word *handbook* in the title is misleading; *treatise* would be more in keeping with the comprehensive nature of the series. The previous three volumes have covered such topics as the chemical, physical, and biological characteristics of various types of water and waste water treatment, sampling BOD measurements, and pesticide analysis. Volume IV deals with the application of instrumental methods of chemical analysis to water and waste water problems.

Each chapter consists of a general introduction to an instrumental method and then a review of the past applications of this particular method to water analysis. Of necessity, the descriptions of the various techniques are at a rather elementary level, but they should serve as a basis for further study of the specialized texts available on each subject. The following techniques are included: flame, emission, and X-ray spectroscopy; radionuclide analysis; gas chromatography; mass and infrared spectrometry; luminescence techniques; and electrochemical methods. In addition, many other methods such as the measurement of pH, conductivity, temperature, oxygen demand, and turbidity are discussed.

The quality of the various chapters is uneven. The description of the application of fluorescent dyes and luminescent detection to the tracing of water flow rates and patterns is excellent. The chapter on the determination of minor metallic elements in water should be quite useful. Of little value is the chapter on monitoring: Although it contains little factual information, it does have several fine photographs of boats. The remainder of the book should be quite useful to someone who is not familiar with modern methods of instrumental chemical analysis.

For someone who is well acquainted with the various instrumental techniques, the application review in each chapter may be of some interest. Although these discussions are brief, this reflects not so much the authors' lack of diligence but rather the lack of ap-

plications of this methodology to water analysis.

The four volumes are well indexed. The author and subject indexes at the end of Volume IV are 145 pages. Combining the indexes into the last volume seems to be a subtle inducement to purchase the complete set.

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Process Plant Design, J. R. Backhurst and J. H. Harker, American Elsevier, New York (1973). 392 pages. \$27.00.

The authors of the text *Process Plant Design* have admirably accomplished their stated purpose of presenting the graduating student with a taste of commercial process design practice. Their ability to explain complex procedures simply and lucidly is to be envied.

Sections are devoted to the design of packed towers, sieve and valve tray columns, as well as evaporators, dryers, crystallizers, and heat exchangers. The method of exposition relies upon short explanations followed by a number of pertinent examples. The major emphasis is on equipment sizing and design rather than on data or on unit operations. Two valuable characteristics are the detailing of cost during discussions of each category of equipment and especially helpful, at this time, is the presentation of almost all quantitative units in both English and SI systems.

In reviewing a text on process design, it is always possible to quibble with the authors' emphasis on various categories. Towers and trays are treated in reasonable detail, but line sizing and piping systems are only briefly mentioned. However, emphasis on different categories of equipment is the prerogative of the authors. The main criticism, after careful perusal of the text, is the complete omission of the impact of computers on process design methodology. In the early stage of computer application, programs were written to allow the en-

gineer to perform hand-type calculations both rapidly and accurately. In the present stage of application, the computer allows the engineer sufficient time to explore a range of options previously difficult or impossible to calculate by hand. Economic optimization is not limited to equipment items but can be applied to complete refineries or chemical complexes. The computer has freed the process designer from much of the routine and repetitive calculations. Computer usage allows the designer a broader scope, reducing the need for fudge factors and eliminating rule-of-thumb design by introducing precise data and detailed calculation methods, as well as the exploration of alternates.

The book should prove valuable not only for the young engineer entering the process design field but also for the more experienced engineer whose entire background has been in operation or research and who is suddenly faced with the task of project engineering by coordinating with a contracting company on a new installation.

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The Vapor Pressures of Pure Substances T. Boublik, V. Fried, and E. Hala, American Elsevier, New York (1973). \$25.50. 626 pages.

Vapor pressures for some 800 pure compounds are presented as a function of temperature. For each material, Antoine constants are also given as well as a detailed comparison as to the fit of the Antoine equation. Since the reported vapor pressure range is normally limited to 1000 to 2000 mmHg, the Antoine equation normally yields an accurate vapor pressure correlation equation.

Usually only one reference is given for each compound and no discussion is provided to indicate the accuracy of the experimental data. Also for some materials (namely, diethyl ether) the highest temperature recorded is even

less than the boiling point at one atmosphere.

In general, the book will be quite useful in process design calculations and will unquestionably reduce the time consuming step of searching the original literature for vapor pressures.

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is provided by a collection such as this to refer elsewhere to related work.

The book is attractively bound in hardcover. However, the type size is too small to be read comfortably.

In balance, the volume provides a very useful discussion of some recent developments in the study of turbulence in liquids and will be welcomed by the large body of researchers having an interest in that area.

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Turbulence in Liquids, J. L. Zakin and G. K. Patterson, (Eds.), Department of Chemical Engineering, University of Missouri—Rolla (1972). 203 pages. \$10.00.

This volume contains the papers presented at the 1971 biennial conference of the Rolla series devoted to turbulence in liquids. These symposia provide an excellent opportunity for researchers in this somewhat specialized area to discuss their work.

In 1971, sessions were labeled Measurement Techniques, Turbulent Burst Signatures, Pressure Fluctuations, Measurement and Analysis of Turbulence, Visual and Light Transmission Measurements, and Needed Data. Most sessions included an invited lecturer. Many papers emphasize experimental techniques, data analysis, and the supporting theory rather than a theoretical description of the turbulence observed. Since the experimental basis for liquid studies has generally been lacking until recent years, this emphasis is justified. Particular attention is given to hot film anemometry and visual techniques such as laser-Doppler velocimetry. Lacking from the collection of measurement technique papers, however, is a critical review of the state-of-the-art pinpointing the questions about liquid turbulence measurements that remain and suggesting work to be done. Discussions of individual papers are concerned with details and generally do not provide perspective.

A noteworthy paper by G. R. Offen, S. J. Kline, and W. C. Reynolds does review current investigations of turbulent shear with particular attention to turbulent bursts. This paper and several others raise concern about the interpretation of conditioned-sampling results.

As is often true for specialized symposia, some authors present only one phase of their work here with their major contribution published in the journal literature. However, incentive

Industrial Source Sampling, David L. Brenchley, C. David Turley, and Raymond F. Yarmac, Ann Arbor Science Publishers, Michigan (1973). 481 pages. \$18.00.

Each audience and reader sees a book differently. I wonder if the authors of this book agree upon the audience at which they have aimed. The preface says that Chapters 1 through 5 are aimed at administrators and that these chapters will be useful to engineers who plan and perform source tests. I doubt that. Those chapters will be most useful in a classroom. Specifically, Chapters 1 to 3 are too introductory. Some of the information may well be useful to administrators and engineers, but I doubt that they will read all of it.

Probably every reviewer sometimes wishes he could have had a hand in the writing. I would have organized this particular book another way certainly, with the very useful Chapter 8 titled "Errors in Source Sampling" located nearer "Computational Methods" which is in Chapter 15.

The list of symbols could have been a little tighter. It would have made reading easier if the authors had selected just one of P_b , P_{atm} , P_{bar} to represent atmospheric pressure.

All books, it seems, suffer from typographical errors. Most in this one are simply letter errors which cause no trouble for the reader, but here and there a sign is dropped as on page 42, or a word is changed, as when impacted particles become compacted particles. One wonders upon discovering one such error if meaning is changed somewhere with another error.

In spite of these negative comments, this book deserves space on the desk of anyone concerned with the subject of source sampling.

Chapters 9 through 14 effectively lead one through preparation for, and performance of, tests. Chapter 8 tells one what could be wrong with the results, and Chapter 15 is a very clear treatment of the necessary calculations associated with those tests. Chapters 16 to 18 assemble in one location a wealth of up-to-date information on equipment and methods for source testing and monitoring. Covered are both commercial instruments and some methods which, although still in development stage, appear especially promising.

My major complaint with the book is its unevenness. The chapters on industrial process information are necessarily quite superficial, while the chapter on error analyses is quite theoretical. That is not a fatal flaw, however, and the book can definitely be recommended.

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Applied Statistical Mechanics, Thomas M. Reed and Keith E. Gubbins, McGraw-Hill, New York (1973). 506 + xx pages. \$18.50.

The authors have presented a current, accurate collection of methods of predicting properties employing the principles of statistical mechanics. The best available statistical mechanical models are presented along with comparisons of calculated and experimental values. The style is uniformly easy to read and the text is well interspersed with examples and figures.

We used this book as a base for discussion in a doctoral colloquium in the chemical engineering department at Texas Tech. Each participant reviewed one chapter at our weekly meetings. We formed the impression that many concepts which could be grasped fairly easily were thoroughly explained, while some of the more difficult were merely stated. We concluded that fruitful use of the book would require more than an elementary background in quantum mechanics and statistical mechanics. However, the calculational methods presented should prove to be excellent for the prediction of both thermodynamic and transport properties in the hands of an experienced statistical mechanician.

We found the book to be very broad in its coverage, both of systems considered (from ideal gases to liquid mix-

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