BOOKS

Lange's Handbook of Chemistry, 11th edit., John A. Dean, (Ed.), McGraw-Hill, New York, xiii + 1, (1973). 576 pages. $19.50.

The problem of writing a review of the new eleventh edition of this well-established popular handbook is similar to that faced a few years ago by Kurt Vonnegut when he was asked by the *New York Times* to review the current edition of *Webster's Dictionary.* Vonnegut chose to focus his attention on the "dirty" words in the new dictionary; your reviewer unfortunately cannot follow an analogous path.

When Nobert Lange prepared the first edition of this work in 1934 there was considerable speculation about the probability of success for a book that seemed at first glance to cover the same field as the then well-established other handbook of chemistry and physics. Lange's handbook did succeed and today occupies a firm position among the many handbooks published by McGraw-Hill.

The present edition, edited by the other John Dean, Professor of Chemistry, University of Tennessee, presents a new organization of eleven sections: mathematics, general information and conversion tables, atomic and molecular structure, inorganic chemistry, analytical chemistry, electrochemistry, spectroscopy, organic chemistry, thermodynamic properties, and physical properties. Each section has separate pagination. As might be expected, the material of earlier editions has been updated and expanded and new material has been added. The latter category includes emission and absorption lines, formation constants of metal complexes with organic and inorganic ligands, selectivity coefficients for ion-exchange resins, Hammett and Taft substituent constants, and mass absorption coefficients of X-ray emission lines.

In any work of this sort the inclusion of new material requires either that new editions will grow to unmanageable size or that some material must be discarded. We all have our nominations for oblivion, but then who are we to characterize as useless the density of aqueous sodium hydrogen sulfite solutions from 10.27 to 368.2 grams per liter concentration of sulfur dioxide? At a time when pocket calculators have replaced the slide rule someone might even try to make a case for discarding the mathematical tables in the next edition.

In my student days I was taught that single-volume handbooks were composed of third-hand information; a variety of illustrations was presented to show how they perpetuated errors. One can hope that during the past 40 years the concentration of errors has decreased, particularly because many chemical engineers continue to shun Beilstein, Gmelin, and the primary literature and to rely on handbook data exclusively. Some of my best friends are chemical engineers; they should be reminded of the witches in Macbeth who lead us on by honest trifles to betray us in deepest consequence.

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Electrostatics and Its Application, A. D. Moore (Ed.), Wiley, New York (1973). 481 pages. $24.95.

This book is a unified, thorough survey of modern electrostatics containing 20 chapters, written by 18 electrostatics experts, and dealing with topics ranging from fundamental concepts to practical applications. The chapters were planned in broad outline by the editor so as to promote an integrated treatment, but each contributing expert was responsible for the content of his chapter. There is some overlap among chapters since the same effects and phenomena appear in different applications of electrostatics, but the resulting repetition is more helpful than annoying.

The first 6 chapters deal with introductory electrostatics, mathematical formulation of electric field analysis, charging of macroscopic particles, static electrification of dielectrics, and long-lasting electrization and electrets. The presentations comprise an excellent introduction or review depending upon the needs of the reader. The remaining chapters discuss major applications of electrostatics, such as motors, generators, precipitation and separation, coating, imaging, printing, dielectrophoresis, electrostatics in the powder industry, atmospheric electrostatics, electrostatic nuisances and hazards. Each of the applications chapters begins with an overview which can be read by electrostatics amateurs—including chemical engineers not highly familiar with electrostatics—for general understanding.

Electrostatics is a fascinating mixture of science and art. Engineers, scientists, or others looking for background information and current literature on specific electrostatic topics will be pleased to find both in one book.

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Basic Principles and Calculations in Chemical Engineering, 3rd edit., David M. Himmelblau, Prentice-Hall, Englewood Cliffs, N. J. (1974). 542 pages. $15.95.

This aptly titled book is designed to serve as an introductory undergraduate text, and its utility is confined to that use. The scope is broad and the coverage thin. The basic principles of conservation of mass and energy provide the framework for a well organized introduction to stoichiometry, PVT relationships (for ideal and real gases), phase change phenomena, and thermochemical and physical properties of matter. Vapor-liquid and chemical equilibria and kinetics are not treated. The final short chapter on unsteady state processes seems almost an afterthought and is not up to the quality of the rest of the book. Well organized appendices cover conversion factors, selected properties of common substances, and a brief treatise on solution of sets of equations.

Each chapter begins with an information flow chart showing the interrelations among topics included in the chapter and material presented previously. Each topic is introduced with a brief exposition of concept, sometimes with interesting historical background and basic data where appropriate. Related calculations are illustrated through solution of numerous examples (136 in all). Many problems (493, including eleven specified for computer application) are presented at the ends of chapters. Each chapter closes with a sometimes extravagant statement of what should have been assimilated and a list of related references.

Considering the space limitations imposed by the breadth of coverage, the conceptual expositions are well done. The examples and problems are well chosen to illustrate a wide variety of related calculations. Some examples and problems are trivial and contrived, others are substantive, relevant and in-

teresting.

The reader is encouraged to develop a basic skill in problem solving. A general technique is outlined, but it is difficult to see that the example solutions presented were in fact arrived at using the recommended technique. More detailed, step-by-step applications of the technique to specific examples, describing in detail why certain bases and system boundaries were chosen and others rejected, would help the reader to understand and assimilate the basic elements of problem solving.

The goal of putting between one set of covers the basic principles and calculations of chemical engineering is an ambitious one, and this book is a carefully prepared and quite successful attempt to reach that goal. However, because of the broad scope, thin coverage, and emphasis on calculations, an introductory course based on this book must be a frustrating experience for many students. It seems somewhat like being introduced to half a dozen very interesting people under circumstances which allow one only to focus on the height, weight, and state of dress of each. In such a situation, one may see what more is there and be content to wait for a chance at in-depth involvement. Unfortunately, the potential fascination may never be recognized and one may depart quickly for more apparent and immediate rewards elsewhere. Chemical engineering deserves a more intellectually substantive introduction than would result from the strict adherence to this text.

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Dust Explosions and Fires, K. N. Palmer, Chapman and Hall Ltd., London (1973). 396 pages. $18.50.

Dust explosions and fires have been the cause of many major industrial accidents and coal mining disasters. Much research has been devoted to this subject at various government, university, and industrial laboratories. Unfortunately, the results of these studies have been scattered around the literature in the form of laboratory reports, papers presented at Symposia of the Combustion Institute, AIChE, and other professional societies and in a number of scientific journals. Dr. Palmer, whose section at the Fire Research Station, Borehamwood, England, has made significant original contributions to this field, has taken upon himself the formidable task of assembling and organizing this information in one book. The result is a valuable, lucid treatise that may be used not only by researchers in the field but also by plant design engineers, industrial safety and fire officials, and students of fire technology.

The book begins with a short introduction to the problem followed by a discussion of standard dust explosibility tests used in various countries and of the application and interpretation of the results of these tests. The mechanism of flame propagation in dust clouds and the factors that control the rate of propagation are next examined. The author then turns to practical engineering applications by identifying common sources of dust ignition and presenting methods for protecting against dust explosions and fires. Guidelines for the design of plants in which flammable dusts are generated or handled are also provided. A comprehensive table in the appendix provides pertinent explosibility properties of dusts of over 400 materials ranging from acetamide to zirconium hydride and including such interesting things as aluminum, barley, dextrin, egg white, garlic, gum tragacanth, lycopodium, moss (Irish), peanut hull, shellac and tea.

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Vapor Liquid Equilibria, L. R. Oellrich, U. J. Plöcker, and H. Knapp, Institute of Thermodynamics, Technical University of Berlin.

An interesting and valuable bibliography of vapor-liquid equilibria data for cryogenic mixtures has recently been published as a private document. Mixture components comprise those materials boiling below 350°K at one atmosphere.

The review covers the period 1900 to 1972. Interested readers may obtain copies by sending negotiable checks in the amount of DM 10 ($4 US) to:

Berliner Bank
Institut für Thermodynamik
Kto. Nr. 996 179 5100

Transfer Processes, D. K. Edwards, V. E. Denny, and A. F. Mills, Holt, Rinehart, Winston, Inc., New York (1973). 361 pages. $15.00.

This book is intended and is well suited for use as an introductory text in heat and mass transfer. Momentum transfer is treated only slightly and a previous course in fluid mechanics or a supplementary text would be beneficial when using this book as a textbook. The basic approach of the authors is to introduce the various transport phenomena from a macroscopic point of view, then treat the transfer process from a microscopic viewpoint, and finally to consider some significant engineering design problems. This sequence will most probably have the advantage of helping to maintain student interest. The calculus level required for a student studying from this book is a knowledge of ordinary differential equations, although penetration theory solutions are discussed for transient conduction and for gas absorption in falling liquid films. There are a wide variety of interesting example problems and these problems are one of the strongest aspects of the book.

The book is organized so that analogous phenomena in heat and mass transport are considered together. Chapters 2 and 3 consider one-dimensional heat conduction and mass diffusion. The concept of transport resistances and transfer coefficients, finite difference methods for solution of the transient diffusion equation, and mass transfer in porous media are treated in these two chapters. Chapters 4 and 5 deal with convective transport. Both forced and free convection are considered and turbulent transport is treated by way of dimensionless correlations. Radiation transfer and free molecule transport are the subjects of Chapter 6. Simple kinetic theory arguments are used in Chapter 7 to derive relationships for the transport properties. Neutron transport is also briefly discussed in Chapter 7. The phenomenological approach is used in Chapter 8 to treat turbulent transfer processes. Chapters 9 and 10 are concerned with equipment design. The concepts of overall transfer coefficients and macroscopic balances are used to design heat and mass exchangers.

References are given at the end of each chapter to other textbooks and these references are often briefly summarized. However, a minor criticism is that no references to the research journals are given. The book could use more polish; however, it is well recommended and should find wide use as an introductory text.

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Gas Analysis Instrumentation, A. Verdin, Halsted Press, New York (1973). 414 pages. $26.00.

This comprehensive book can serve equally well as an introductory text for a novice in the field and as a reference source for an experienced instrumentation engineer. It pulls to-