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BOOKS

Physical Chemistry of High Temperature Technology, E. T. Turkdogan, Academic Press, April 1980, 447 pages, $49.50.

The author of this work is the elder statesman of industrial process metallurgy. The volume therefore contains a wealth of factual information that he has acquired over the years. Because most of these years have covered a period when physical chemistry, rather than process engineering, was dominant in process metallurgy, the book is canted in the direction of the former topic, as the title implies. The work is divided into two parts: "Fundamentals" and "Applications." The division is arbitrary since there is much in the second part, for example, the chapter on rate phenomena, that this reviewer would regard as fundamental. It is in the first part that the reader will find the most valuable material, a critical review of physicochemical data together with predictive and correlative techniques for physical properties.

The book is not likely to find use as a text since its approach is encyclopedic, rather than heuristic. Turkdogan's lack of exposure to an audience of uncomprehending students is evident from his frequent failure to provide full explanations or derivations. An example would be the author's mention, in a section on diffusion in metals and alloys, of a "backscatter effect" without further elaboration concerning the nature of this effect. A second example, in connection with the work of Chatterjee and Bradshaw on the impact of a gas jet impinging on a liquid surface, is Turkdogan's presentation of the relationship between the depth of the depression formed at the liquid surface and the onset splashing, without providing the relationship (present in the original work) between the depression depth and jet momentum.

It is regretable that the opportunity to present physical property data in SI units was not seized. Equally regretable is the failure to provide a list of symbols, particularly since some symbols are not even defined when they are first used! The index is rather scant for a work of this nature; for instance "Fick's law," "flames," "refractory" and "thermocouple" do not appear therein.

Most of the work will be comprehensible to those with a batchelor's degree in chemistry or metallurgy. The subject matter is treated with sufficient depth in the first part, but the second part is occasionally superficial, for example, in its treatment of heat transfer by radiation. There is little presentation of experimental technique despite the author's substantial reputation as an experimentalist.

The fundamentals part of the book will be of great interest to those working in any field of high temperature technology. The second half is mainly concerned with iron and steel, and those oriented towards such technologies as nuclear energy, aluminum smelting, geothermal energy and the incineration of wastes must look elsewhere for their applications.

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Chemical Engineering Communications (an International Journal for Communications of Research), Edited by: Standard and Ulbrecht, Published by: Gordon and Breach, Price: Individual $43.00 Library $83.00.

Chemical Communications actually started publication in 1973. The original intent was to publish full length research papers, short letters and review papers à la the now defunct, but well remembered *Industrial and Engineering Chemistry* reviews. The then editors—Pings and Seinfeld published twice in 1973, four times in 1974, once in 1975, twice in 1976. Three reviews appeared and four letters along with numerous research articles in a broad spectrum of topics (approximately 20% of the papers were in the area of fluids, 20% in control and optimization, 20% in kinetics and catalysis, 20% in transport and the remaining 20% were in areas such as diffusion, numerical analysis, thermo dynamics and heat transfer). With the January, 1978 edition, the current editors, Standard and Ulbrecht, began publication. The most recent edition was the May, 1978 volume which is somewhat disappointing with two major articles and one letter. One of the major articles is a review and the other a research publication.

Problems with this journal might be the fact that the audience was not well defined and its objectives too broad for a non society publication. The purpose of the journal is "an international journal devoted to the publication of full length research articles covering significant completed research, short letters giving preliminary announcements of results and occasional papers in chemical engineering, applied chemistry and related fields." The editors are hoping for rapid publication of papers enabling prompt and a lively exchange of ideas.

In the past, the quality of the research articles has been good and we can hope with new leadership that this journal can be an interesting forum for the serious chemical engineering researcher.

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Liquids and Their Properties: A molecular and macroscopic treatise with applications, by H. N. V. Temperley and D. H. Trevena, Published by John Wiley & Sons, Inc., 274 pages, $37.50 (1978).

This book is a useful survey of liquids that combines molecular and macroscopic approaches. It is designed to be of use to students in the pure and applied sciences, and also to research workers in other fields who require a basic knowledge of the liquid phase. As is the case with other recent books on liquid state, this one seems to emphasize new insights into the structure and properties of liquids at the molecular level that have resulted from computer simulations, beginning about 1957, and the parallel developments in theory and experimental methods. It differs from other recent books in that it covers a wider variety of topics, including hydrodynamics, acoustics, liquids under tension, and other specialized or applied topics that are specialties of one or both authors.

Its most serious shortcoming is that it attempts to cover too many topics in too little space, with the result that many sections are so brief as to be of doubtful value. The section on solutions of gases in liquids, for example, consists of five sentences and includes no specific references for further reading. The variety of topics covered gives it something of the flavor of a book in which each chapter is by a different author.

On the whole, however, the book lives up to its stated purpose. For non-specialists it will provide a timely introduction to the field, and will serve as a useful reference.

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Principles of Photochemistry, by J. A. Barltrop and J. D. Coyle, John Wiley and Sons, Chichester, New York, Brisbane and Toronto, 1979, (214 pages). $12.50.

As recently as twenty years ago, a review of a work that dealt exclusively with photochemistry might have seemed bizarre in these pages; attempts during the 1940s and 1950s to devise photochemically driven processes for the production of bulk chemicals had not been gaudy successes. In the meantime, photochemistry has matured startlingly, aided in no small measure by the invention of the laser which has created new horizons both for scientific and engineering studies and for the chemical industry. As a result, the late 1970s find increasing numbers of chemical engineers using photochemical techniques, for example, in investigations of flames and of fuel combustion; in surface studies of catalysts; in attempts to understand and to increase biomass yields; and in campaigns to create new, solar-driven chemical syntheses.

When Baltrop and Coyle's 376 page monograph "Excited Studies in Organic Chemistry" appeared in 1975, it received a warm critical reception. The authors wrote in their preface that they hoped their work would serve both as a reference for practicing photochemists and an instructional text for undergraduate and postgraduate students. Given the price of that volume (now ca. $41), my guess is that students have not been rushing to the bookstalls for it. The present work is a different matter. Published in a quality, softbound version at about $13, it comprises the first six chapters of the original. These deal, in an exceptionally lucid manner, with the theoretical foundations of photochemistry.

Since adequate summaries of each of the six chapters have already appeared in reviews of the original version (cf. *Nature 260*, 735, 1976; *Science 193*, 670, 1976), they are eschewed here. Note, however, that this is not a "how to" manual although it does provide enough references to the experimental literature to permit a novice to begin laboratory work.

Missing from the present volume are the final five chapters of the original, which provide an uniquely organized and valuable review of the photochemistry of organic molecules. In their stead is a valuable set of problems with solutions to help students (or other photochemical neophytes) determine if they are mastering the material.

A familiarity with quantum chemistry at the level that now exists in many chemistry and chemical engineering undergraduate curricula would be helpful, if not essential, for anyone approaching photochemistry for the first time. The authors of this book, however, have performed a marvelous hat trick in producing a work from which both novice and expert may learn.

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Fluid Flow and Heat Transfer, Aksel L. Lydersen, x + 357 pp., John Wiley & Sons, New York, 1979, $42.50.

This book will be welcomed by engineers concerned with the industrial applications of fluid-flow and heat-transfer principles. It is written from the unit-operations viewpoint, with plenty of worked examples. Those expecting much in the way of differential equations will be disappointed. The overall thrust is best revealed by paraphrasing the table of contents: pressure drop; dimensional analysis; flow measurement; pumping, compression, and expansion; agitation; particle and drop mechanics; filtration and flotation; atomization, dispersion, etc.; steady- and unsteady-state heat transfer; energy economy.

The book is well illustrated, particularly with equipment-related diagrams. A significant sacrifice of depth, particularly in the heat-transfer portion, is inevitable in such a compact book, but this shortcoming is more than compensated by the breadth of coverage. The author's claim that "this text is concerned with the calculation of the major dimensions of equipment and of the consumption of energy" is accurate. So is his assessment that the text would work well in conjunction with Perry and Chilton's *Chemical Engineers' Handbook*. Overall, the book meets its purpose successfully.

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Developments in Heat Exchanger Technology, edited by D. Chisholm, Applied Science Publishers Ltd., London 1980, (300 pages) $65.00.

Any book which promises to present an update on heat exchanger design techniques should certainly be welcomed by many engineers. This work attempts to cover an enormous area, starting with (1) Shell-and-Tube Exchangers in Single Phase, (2) Reboilers, (3) Condensers, (4) Compact Heat Exchangers, (5) Air Coolers, (6) Augmented Surfaces, (7) Heat Pumps, and (8) Waste Heat Recovery, treated by ten authors. The chapters have been written specifically for this book, while in most cases drawing on published work. Some degree of haste in putting this volume together is apparent.

Overall, the treatment of the subjects in the various chapters is extremely uneven, ranging from presentation of well-established relations which have nothing to do with "new developments," to rather highly specialized, detailed aspects requiring a thorough knowledge of the background. Other chapters, especially that on Air Coolers, represent—if not any new developments—a very concise and readable survey of all the important design parameters. The chapters on Compact and Heat Recovery Exchangers contain descriptions of some designs and operational characteristics which are rather hard-to-find otherwise. Enhanced Surfaces are well summarized, based on published material.

Each chapter has its own references with a varied degree of completeness which, in most cases, leaves much to be desired. A separate chapter is devoted to a Bibliography with 526 entries and a Subject Index, which is supposed to supplement material not covered otherwise. Again, the content is very unevenly distributed, e.g., with a single entry under "Design" to 41 entries under "Heat Pumps." Nevertheless, some of the better and original contributions may make the book worthwhile to have as a reference.

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Kinetics and Mechanism 3rd Edition
John W. Moore and Ralph G. Pearson, Wiley-Interscience, New York, 1981, 455 pages, $32.00.

Frost and Pearson's "Kinetics and Mechanism" has been standard fare for more than 20 years, and the appearance of the third edition will whet the appetites of many chemists and engineers.

The book is a clear presentation of the kinetics of homogeneous reactions, written at a level suitable for advanced undergraduates. The subjects considered in depth include experimental methods of reaction kinetics, treatment of data, collison theory, transition-state theory, reactions in solutions, homogeneous catalysis, and chain reactions. The book complements textbooks used for courses in chemical engineering kinetics and reaction engineering, providing numerous examples of reaction mechanisms and helping students develop a chemical sense that they will not extract from the chemical engineering texts.

Whereas the earlier edition had a long final chapter presenting detailed case studies, the