BOOKS

Dangerous Properties of Industrial Materials by N. Irving Sax. Van Nostrand Reinhold, Fifth Edition, 1118 pages, $54.50, April 1979.

The many regular users of Sax's classic "Dangerous Properties of Industrial Materials" will welcome this fifth edition which retains the general format of the fourth while increasing the listing of common industrial and laboratory materials from about 13,000 to about 16,000. Section 12, General Chemicals, comprising about 70% of the text volume, presents alphabetically and concisely general information on each material (synonyms, description, formula, and physical constants) followed by toxicity data, fire and explosion hazard analysis and counter measures. This section has much new information and for most materials provides bibliographical references to the supporting documents. These references, which had not been supplied previously, are a valuable addition.

The first eleven sections are generally approached as in previous editions (with in many cases the authors being the same as for the fourth edition). These sections collectively comprise about 30% of the total text volume. They are concise, contain a wealth of detail, and provide a fast introduction to many aspects of handling dangerous materials. A listing of the section headings will best outline the contents of these sections: 1. Historical Perspective; 2. Industrial Air Contaminant Control; 3. Industrial Noise: Effects and Controls; 4. Air Pollution Control Requirements for Industrial, Commercial and Public Facilities; 5A. Radiation Hazards; 5B. Large Radiation Sources Applications and Safeguards; 6. Health Hazards of Solid-Waste Treatment; 7. Industrial Fire Protection; 8. Industrial and Environmental Cancer Risks; 9. Toxicology; 10A. Chemical Substances Legislation; 10B. An Industrial Response to Chronic Health Hazards; 11. Labelling and Identification of Hazardous Materials. Sections 10A and 10B are new, replacing Food Additives of the fourth edition.

Sax's regular readers will soon become accustomed to the slightly changed format of Section 12 and new readers will be impressed with the wealth of information and understand why Sax has become the classic in the field.

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Principles of Polymer Processing. Zehev Tadmor and Costas G. Gogos. 736 pp. Wiley-Interscience, 1979. $37.50.

One sign that a scientific or engineering sub-discipline is approaching maturity is the appearance of comprehensive and definitive books on the subject. The textbook by Tadmor and Gogos on processing of polymeric materials is such a book. The similarity of experiences of a polymeric material in different processing operations is stressed by conceptually breaking all processes down into elementary steps and shaping operations. Different specific processes or machines which are used in practice are presented as different routes or mechanisms for accomplishing the important elementary steps of melting, mixing, pumping and solids handling. Each of these is treated in detailed individual chapters by developing the engineering mathematical analyses of the various mechanisms for accomplishing the elementary steps.

Shaping operations are treated separately with chapters on die forming, molding, calendaring and secondary shaping. The final chapter shows how some fourteen important actual processes can be broken down into constituent elementary steps and shaping operations. The attempt is made to introduce the reader to some concepts of design *synthesis*, a refreshing change in an area where research has been dominated by *analysis*.

Early chapters in the book provide useful, though highly abbreviated, introductions to some of the basic principles of polymer physics and morphology, and their interplay with processing, as well as the equations of mechanics of continuous media. The uninitiated may have difficulty beginning these subjects with this text. The authors motivate further, more in-depth study.

Where appropriate, the text is augmented with solved quantitative examples and it contains over 130 homework problems. It is very well referenced and indexed. One may make some minor criticisms of the book, especially with regard to material *not* covered. Heat transfer coverage is limited primarily to melting, with little treatment of convection or viscous dissipation. Mass transfer problems go virtually unmentioned. These really are minor points given a book which treats the comprehensive set of problems it *does* tackle with such excellent con-

ceptual organization and clarity. An other important recent book in this area, Middleman's *Fundamentals of Polymer Processing* (1977), is more suited to students less well-grounded in continuum mechanics, due to its lucid development of that subject. Throne's *Plastics Process Engineering* (1979), while perhaps most closely related to practical experience, is much less well organized and presented. Tadmor and Gogos' book is more comprehensive and will be a very important and useful addition for practitioners, teachers and more advanced students.

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Applied Instrumentation in the Process Industries, Volume IV, Control Systems: Theory, Troubleshooting and Design, Leslie M. Zoss, Gulf Publishing Company, Houston, Texas, 179 pp., $33.95.

Professor Zoss' book presents a brief and relatively elementary discussion of control systems as applied in the process industries. It also confines its treatment almost completely to the use of single loop pneumatic analog controllers. There is only a brief mention of more advanced concepts and of digital control systems.

The book presents extensive computational examples to illustrate the points being made and there are a large number of additional problems posed for the reader or student with the answers to these presented in an Appendix.

The subject of process and control system dynamics is extensively explored with process dynamics being confined mainly to the overdamped case. Underdamped or oscillatory systems are treated in the context of controller and controlled system dynamics.

The author is to be commended for his integration of the responses of the process, the controller and the associated components in order to obtain the overall response of the "controlled system" as the basis for controller tuning. This subject appears to be the most difficult for other text authors to manage but is well treated here.

This book is recommended for the industrially based engineer who needs a beginning or a brief review text to help him become more knowledgable of basic control system theory and its relationship to the control systems applications he is making daily in his work in industry. The extensive example computations and student problems with answers will be especially helpful for such an individual.

The book suffers somewhat from the necessity to crowd such a big subject into a relatively small book, as a result the explanations tend to be brief and the text jumps quickly from one topic to another. This reviewer was also disturbed with the typography and workmanship of the book itself. It gives a cheap appearance even though the price is anything but inexpensive.

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Process Control Systems, Second Edition, by F. G. Shinskey; McGraw-Hill, February, 1979; 349 pages; $22.50.

This text is a substantially revised and updated version of the author's first edition on process control. While the subject matter covered is essentially the same as that in the first edition, many new examples are included and several sections have been rewritten based on the author's experience in teaching the material. The most extensive revision has been carried out in the section dealing with multiple loops. One good feature of the new edition is the inclusion of answers for the problems at the end of each chapter.

The major strength of this text lies in the vast number of real applications which are presented. In addition to simple loops such as flow and level loops, examples of controlling distillation columns, chemical reactors, heat exchangers, compressors and the like are treated. These examples are drawn from the author's own experience and clearly illustrate control as it is practiced in industry today.

While the text is very strong on applications it is weak on theory. A time domain approach is used to explain feedback control. While this approach avoids the problem of some knowledge of advanced mathematics, it does not give the reader a base which is fundamental enough so that he can build and expand his knowledge. In attacking and explaining solutions to control problems the author is particularly incisive. He is able to get to the heart of a control problem and he explains, in simple terms, his solution to the problem. One wonders, however, whether the typical reader who lacks insight into control problems can do the same or modify the approaches given to cover his own situation. In order to make such modifications the reviewer feels that a more solid grounding in fundamentals than that given early in the text is necessary.

Because of the lack of a theoretical basis, academics would have difficulty in using this text as the only book in a course on control. As a reference book both for course work and research on control this text is invaluable. It contains a great many nuggets of information and examples which are not given elsewhere. For anyone interested in applying control theory this text should be part of their library.

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Handbook of Industrial Energy Analysis, I. Boustead and G. F. Hancock, John Wiley & Sons, New York, 1979, 422 pages. $69.50.

The authors of this book, who are affiliated with Britain's Open University, state that it is intended to explain how to calculate the "primary energy required to manufacture a product from raw materials in the ground". Thus, it deals only with the analysis of existing processes and does not treat the subject of efficiency of energy utilization. There is only superficial reference to the principles of thermodynamics, and energy is considered only in the context the first law. No use is made of the concepts of availability or exergy.

The book explains in great detail how to deal with complex processes consisting of many interrelated subsystems. Among the topics treated are recycle, apportionment and capital energy. A 100-page appendix contains an extensive tabulation of the energy requirements of many industrial processes, as reported in a wide variety of published sources.

The authors say that "the book is aimed primarily at managers, both technical and nontechnical" and that it "would be suitable as an introduction to the subject for undergraduates or graduate students in energy analysis and environmental sciences". In order to make the presentation accessible to readers without a technical background, very little reference is made to scientific principles, and there are very few equations. Instead the approach is formalistic with many rules, definitions and basic concepts set out in bold face type. As a result of this the text is very wordy, and this diffuseness will no doubt prove irksome to engineers or scientists who try to read it. Nonetheless, the type of energy analysis described, although thermodynamically simplistic, is currently the one most used in practice, and it is important that non-technical personnel be familiar with its language, its methodology and its pitfalls.

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