BOOKS

Tellurium, W. Charles Cooper, (ed.), Van Nostrand Reinhold Co., New York (1971). 437 pages. $22.50.

This book is based in part on a tellurium symposium held at Rutgers University in April, 1964. Eleven chapters, each by an authority on the subject, cover the production, properties, chemistry, and uses of this element. Since Kirk Othmer devotes only 16 pages to the subject, an additional reference work is welcome. Copious references are included, many dating from the 1960's, indicating the recent interest in the physics and physical properties of this relatively rare metal. It is unfortunate that the authors quoted so many Chemical Abstract references without apparent critical review.

Every engineer is rightfully curious about elements, such as tellurium, with which he does not come into regular contact, but tellurium's rarity will limit the book's attraction to chemical engineers. The metallurgical applications are interesting but not extensive. It would appear that its thermo-electric properties are undoubtedly the area of greatest future interest. The authors speculate on the potential uses in special heating and cooling devices where cost is not a deterrent.

Although tellurium is recovered almost exclusively as a by-product from copper refining and the recovery is reported to be quite low, the available supplies far exceed current uses. One suspects that both the above mentioned symposium and this book are aimed at stimulating interest in commercial uses for tellurium.

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Analysis of Heat and Mass Transfer, E. R. G. Eckert and R. M. Drake, Jr., McGraw-Hill, New York (1972). 806 pages. $21.50.

This is an expanded and updated version of "Heat and Mass transfer" by the same authors. As was the case with the original, the section on mass transfer is inadequate from the point of view of chemical engineers. It comprises barely 5% of the volume and is too cursory to be of much use.

The bulk of the text is fairly evenly distributed between conduction, convection, and radiation. Here, the contents of the original work have been substantially updated and expanded. Special cases of heat transfer and a significant number of up-to-date numerical techniques are presented—frequently through examples.

The feel of the book is reminiscent of the third edition of *Heat Transmission,* by McAdams. It gives the impression of having been put together by knowledgeable and competent men who are too busy to write with the care and attention to detail required to produce a truly valuable textbook. As a minor example, although differential equations are the mathematical tool of choice, there are brief, irritating lapses into vector notation.

Although it is intended to be a text for seniors and beginning graduate students, this edition suffers from two defects that most potential users may find damaging. First, it lacks an aura of conviction. It tends to present rather than teach. Second, there are very few numerical examples and no assignable problems.

As a reference work, it is a positive contribution. I expect to refer to it frequently and believe many others will do the same.

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Theory of Particulate Processes, Analysis and Techniques of Continuous Crystallization, A. D. Randolph and M. A. Larson, Academic Press, New York (1971). 251 pages. $14.50.

This is primarily a book on crystallization. Randolph and Larson pioneered the application of population balance techniques to continuous crystallizers, and the *Theory of Particulate Processes* is mainly a summary of their own research over the last decade. As such, it will be an indispensable aid to anyone interested in the mathematical characterization of crystal size distributions. The classical case of a mixed-suspension, mixed-product-removal crystallizer with homogeneous nucleation and size independent growth rate is treated in detail. Complicating factors such as secondary nucleation, fines destruction, and classified product removal are discussed more briefly and generally to the extent to which the authors or their students have tackled these problems. Although the selected bibliography is quite comprehensive in the field of continuous crystallization, this outside literature is not always properly integrated with the authors' own work. Selection of topics and depth of presentation thus tends to be uneven. The chapter on crystallization kinetics is only ten pages long while nine pages are devoted to reviewing a recent thesis on crystallizer cascades. A more descriptive subtitle for the book would be Selected Topics in Continuous Crystallization. Despite this criticism, the book remains a worthwhile and welcome contribution to a field largely developed by the authors themselves. It should be acquired by everyone with a serious interest in crystallization.

The book also provides a relatively formal treatment of the generalized population balance. Chapters 2, 3, 4, and 10 give a readable account suitable for a general audience. In this respect, the book is most comparable to Himmelblau and Bischoff's *Process Analysis and Simulation.* The two texts are complementary and either can be recommended as a supplement to the other. Randolph and Larson stress size distributions while Himmelblau and Bischoff emphasize residence time and age distributions. Both approaches are useful and the *Theory of Particulate Processes* can be recommended as a good introduction to one aspect of population balance methods.

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The Principles of Gas Extraction, P. F. M. Paul and W. S. Wise, M&B Monograph CE/5, Mills & Boon, Ltd., London (1971). 72 pages. £1.5.

Gas extraction processes utilize the solvent power of a dense, relatively low temperature gas to effect separations. For example, around ambient conditions (298°K and 1 atm = 0.1013 MN/m^2) the concentration of capric acid in ethylene is about 3×10^{-8} g/dm^3. If the ethylene pressure is increased to about 8 MN/m^2, the capric acid concentration in the gas phase increases to 7 g/dm^3—an increase of some 2×10^8 fold! Authors Paul and Wise cite many such cases in this book to emphasize the significant increase in solubility when the gas phase is at high pressure and a low temperature, that is, near or below its critical point. In addition, they note some industrial applications, an example of which is the use of dense methane or ethylene for stripping coal tar or deasphalting. Finally, the authors explore the possibility of employing dense gas extraction in biological chemical purifications, polymer separation, desalination, chromatography, and other processes wherein high temperatures are detrimental. In pointing out the possible applications of the technique, the book is valuable, though not exhaustive, for example, no mention is made of the phenomenon's importance in cryogenic gas purification processes.

The theoretical foundation laid for understanding the phenomenon and for actually estimating the enhancement of solubility is too brief, and some of the estimation techniques are out of date. Readers unfamiliar with the area will unfortunately have to return to the original literature.

Despite its shortcomings, however, the monograph is easy to read, provocative in suggesting new applications for this phenomenon, and will be well worth the few hours spent in reading it thoroughly.

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New Energy Technology—Some Facts and Assessments, H. C. Hottel and J. B. Howard, MIT Press, Cambridge, Mass. (1972). 364 pages. $2.95.

The authors are recognized authorities in the engineering sciences and are well qualified to present the current status of the energy crisis.

The introduction and summary are worth the price of the book. An excellent and concise presentation of the energy needs of the United States and the world is given along with the supplies available from gas, oil, coal, and nuclear power. Per capita consumption of energy in the United States if equaled by the rest of the world "will require the effective contribution of the scientist, the engineer, the economist, the industrialist, and the statesman."

Energy sources, transportation, and environmental effects are adequately covered. The effects of energy production on the environment are given from an engineering background and hence, the problems are placed in a perspective not dominated by hysteria.

The chapter on fossil fuel-to-fuel conversion is an excellent summary of the processes available at present for conversion of coal, oil, shale, and tar sands to high BTU gas and oil. Research needs for each source of energy supply are appropriately set forth and constitute a needed addition to the literature. The authors state: "a final choice of process that saves 10¢/1,000 cu. ft in manufacturing cost will, in the days when our consumption of synthetic pipeline gas is one-third that of natural gas in 1970, amount to a saving of $750 million per year." This chapter contains only a minimum amount of theory on coal gasification. Expansion of this section would be welcomed.

Sulfur-free fuels from coal that can be used in gas turbines to produce power are also recommended for consideration because of the shortcomings encountered with sulfur dioxide cleanup of power stack gases. Sixteen processes for sulfur dioxide removal from stacks are listed. The author states that sulfur dioxide pollution is a local problem and not a global problem because of the short life of sulfur dioxide in the atmosphere.

Nuclear generated electric power is expected to rise from 6×10^3 MW in 1970 to 735×10^3 MW in the year 2,000. The authors' discussion is comprehensive for the many different types of reactors, including the breeder variety. However, very little is said about nuclear fusion as a source of power. A reader will find a thorough discussion of the safety problem and disposal problems associated with spent nuclear fuel.

Finally, because of the vast amount of power consumed by the automobile and by home heating and air conditioning, the prospects of energy sources for these purposes is covered, including a comprehensive discussion of solar energy, which is not expected to contribute significantly to our energy needs. "Until new knowledge is available, studies of large-scale power from the sun via the flat-plate collector are a waste of time and money. The need is for cheaper collectors and for better photovoltaic cells." The latter appears to be "the only hope for solar power."

The book is a much needed contribution to the literature on our energy problems.

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for 1,000 points in the temperature interval $T_r = 0.7 \div 2.6$ and pressure $P_r = 0.1 \div 5$. For the calculation the computer "Minsk-22" was used. One hundred isotherms were tested, each containing 10 points. The mean square deviation for every isotherm was taken as a measure of the correlation quality.

It was very easy to establish the striking effect of the temperature on the accuracy of all the correlations: at all pressures the RKA is the best up to $T_r = 1.4$ Above this temperature the best is the RK, but even here the RKA is not far behind.

Only for 10 isotherms was the RKZ slightly better than two others. Unfortunately for many other isotherms the deviations obtained for the RKZ are too great: 10 times and more than for the RKA and RK.

Now we consider that it might be rather sensible to use the RKA in the Chao-Seader method instead of the original RK.

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TO THE EDITOR:

The Design Institute for Multiphase Processing (DIMP) which was discussed in the March editorial is, like many Institute activities, the product of considerable volunteer effort. Several people not currently associated with the program played key roles in advancing DIMP from inspiration to reality. In this connection we wish to acknowledge the foresight and effort of G. E. Alves and Dr. H. S. Kemp of DuPont and Dr. G. D. Towell of Shell.

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