All-in-all, however, the book is a good one for a personalized or self-paced mode of instruction if the instruction is combined with discussion sessions which fill in some omissions and clarify some sources of confusion. The author states in the introduction that if this programmed text is utilized as suggested, it "encourages the reader to exercise a higher level of thinking" than would a standard or more conventionally-written book, and I tend to agree with him.

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**First World Filtration Congress: Papers Presented (1974), Société de Chimie Industrielle,** Halsted Press, Wiley, New York (1974). 295 pages. $32.50.

Of the 53 papers scheduled for the First World Congress, 49 are summarized in lengths ranging from 2 to 5 pages: 22 are in French. A veritable potpourri, the table of contents divides the material into the following six categories:

A. Bases theoriques, (12 papers); B. Automobile (6); C. Elimination dans les liquides (primarily deep beds) (6); D. Recuperation dans les liquides (rotary vacuum filtration, washing, deliquoring) (5); E. Filtration des gaz (9); and F. Osmose et ultrafiltration (10).

Le Groupe Filtration of the European Federation of Chemical Engineering struggled for two years to develop the First World Congress with the notable absence of cooperation of the Filtration Society which is based in England and draws half of its membership from the United States. Virtually all papers were accepted much in the style of AIChE national meetings. The short summaries vary widely in quality and frequently present only a portion of the delivered paper. This reviewer's own abstract is a weak substitute for his complete article presentation at the meeting.

In spite of weaknesses, the reader can obtain a sizable amount of information from the summaries. Of particular interest is the opportunity to see what problems are occupying Europeans, including a few from the Socialist countries. Unfortunately, and as usually happens, several papers from those countries never arrived.

It would be impossible to discuss all of the papers. Horvath (Hungary) touched on the relationship of high rates to hydraulic gradient in granular beds. Murkes (Sweden) shed little light on the difficult problem of scale-up of centrifuges. Fitzpatrick et al. (United States) competently discuss improvement in granular bed design. Difficulties attendant to degasification in beds during filtration was touched on by Leclerc et al. (France). From Italy (Fasoli et al.) came a treatment of radial deep-bed removal of oil in a moving bed filter. Sopher (United States) asserted that time between overhauls for interval combustion equipment could be tripled by improved air, fuel, and lubricating oil filtration.

Shirato (Japan) et al. examined power law behavior of filtration of non-Newtonian liquids. Zagrodzki (Poland) provided operating data for sugar filtration. Polyelectrolyles were the subject of the paper for Adin and Rebhun (Israel). They related jar tests to optimum dosage and studied the effect of bed depth or efficiency.

Claes et al. (Belgium) demonstrated confidence in fixed and moving beds for aerosol filtration. Stenhouse et al. (England) discussed theoretical and experimental studies of air filtration with resin impregnated wool filters. Loffler (Germany) described high-speed cinematographic techniques for obtaining particle trajectories and adhesion. Saravacus and Mitsoyannis (Greece) presented data on calcium salt fouling of reverse osmosis membranes.

The wide coverage and abbreviated summaries permits the reader to sample many fields quickly.

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**Introduction to Process Economics,** F. A. Holland, F. A. Watson, and J. K. Wilkinson, John Wiley, New York (1974). 290 pages. $17.50.

In general, this book is excellent. However, I feel the math may be too rigorous for many who have been out of school for more than a few years. More practical examples and possibly less theory would certainly make the material more interesting. The symbols and numbering of the equations are most confusing.

Some of the statements are not well defined in symbols and need the help of words. For instance, in the discussion of interest, $i' \leq i$ needs to be supported by saying "the nominal interest is less than or equal to the actual interest," or "you lose money when buying money if your effective interest computation makes it far different than the nominal interest." Bluntly, you do not get something for nothing, but watch out for the accountant with the fast pencil.

I do not see why Chapter 2, "Previous Methods for Calculating Capital Investment," is a separate entity. It contains the historical aspects of Chapter 1 and could have been combined with that chapter. Chapter 2 is even more superfluous because a better method in cash flow analysis is available. Chapters 3 through 8 are far more relevant.

Unfortunately, the book is too theoretical for many practicing engineers although they do need the information therein. It is better suited for the classroom or to a manager or accountant. Nevertheless, this book will join the others on my reference shelf because the content is useful; however it would be called upon more frequently if I didn't have to forage through quite so much theory to find the information I want.

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**Advances in Preconcentration and Dehydration of Feeds,** Arnold Spicer (Ed.), Halsted Press, New York (1974). 526 pages. $60.00.

One item that appears to be rising faster than the price of food is the price of books about food. I quickly decided I could not afford not to review this book comprising the proceedings of a symposium sponsored by the International Union of Food Science and Technology at Croydon, Surrey, England, in 1973.

The book brings together papers on new methods for preconcentration and dehydration of foods, an area of growing importance due to the increasing demand for convenience foods, and to the food processing needs of a world dealing with a food shortage. Since the book is "unit operations" oriented, it has applications for the chemical, oil, and drug industries.

The session on fundamentals provides a technical basis for compatibility of the remaining papers. Concentration processes are nicely unified by H.A.C. Thijssen's paper. The fundamentals of dehydration processes are well presented by M. Karel. The papers on essence recovery and rheological aspects of juice recovery are out of place in the fundamentals section. They fail to expand or build upon the base provided by the papers on concentration and dehydration. This letdown is typical of all sessions.

The second session, dealing with nonmembrane concentration methods contains another excellent paper by Thijssen, this one on freeze concentration. Due to the extensive literature on evaporation, Mannheim and Passy properly concentrate on equipment

and problems. The potentially interesting paper on dehydration by heat of crystallization is, unfortunately, too brief to be of any value. In addition, A. I. Morgan, Jr., the chairman of this session, should have included the work of his own laboratory on dehydrofreezing.

The session dealing with membrane processes has excellent papers by A. S. Michaels, "Tailored Membranes," and R. F. Madsen, "Membrane Concentration." Again, the other papers are of questionable value. This is unfortunate since good papers on membrane deposition and on equipment would have completed an excellent grouping.

The session on spray drying is well balanced between equipment description and theory. The last session on novel dehydration methods contains a good summary of recent freeze-drying literature by Lorentzen and an excellent paper by C. J. King presenting and unifying novel dehydration techniques.

This collection of papers is very uneven. In addition, the discussions following each paper add little to the value of the papers and contain many errors. The better papers would form an incomplete but good treatise on preconcentration and dehydration for any area of application.

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**Spouted Beds,** Kishan B. Mathur and Norman Epstein, Academic Press, Inc., New York (1974). 304 pages.

Spouting has been called *Canadian Fluidization*, and it is fitting that this comprehensive work should have been prepared in Canada by two of the earliest workers in the field. The authors amply justify their claim that the operation of solid-fluid contacting by formation of a controlled jet (or of jets) deserves a separate name and literature.

Perhaps the most important advantage of spouting over fluidization is the smoothness and ease of control with which large, monodisperse materials like wheat can be contacted. Since conception of the idea in the mid 1950's, a literature of over two-hundred papers has appeared. Many of these have come from the relatively inaccessible literature of Eastern Europe and the Soviet Union. The references appear to have been translated with meticulous care. The discussion proceeds in a logical and orderly sequence through bed dynamics, transfer operations, chemical reactions, applications, and design suggestions.

A particularly helpful feature of the book rests on the critical assessment of the many design equations available. Additional previous unpublished data have sometimes been included to assist in the evaluation.

The text is relatively free of typographical errors, and the style is lucid and concise.

*Spouted Beds* should be of use to anyone designing, developing or assessing a fluid-solid contactor and to teachers of contacting operations.

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## ERRATA

In "Synthesis of Fault Tolerant Reaction Paths" [21, 90 (1974)] by Gary J. Powers et al., the following corrections should be made:

1. The second part of Equation (6) should read

$$+\left(\prod_{[jk,l]} P_{m,n}\right)\left[\operatorname{Min}_{[j,k]}\{\overline{RC}^{*}_{j,k} + \overline{C}^{*}_{j} + \overline{C}^{*}_{k}\}\right]$$

2. Equation (11) should read

$$P = 1 - (1 - p_x)(1 - p_y)(1 - p_z)$$

3. Figure 2 should read

$$p_{ABCD} = 1 - (1 - p_3)(1 - p_2)(1 - p_1)(1 - p_A)(1 - p_B)(1 - p_C)(1 - p_D)$$

and

$$p_{ABCD} = 1 - (1 - p_6)(1 - p_5)(1 - p_4)(1 - p_A)(1 - p_B)(1 - p_C)(1 - p_D)$$

GARY J. POWERS

In "Optimal Temperature Policy for Reversible Reactions with Deactivation: Applied to Enzyme Reactors," by W. R. Haas, L. L. Tavlarides, W. J. Wnek [20, 707 (1974)], the following corrections should be made:

On page 710, the fourth line before Equation (27) should read . . . $\text{min}^{-1}$ and 15,500 cal/g mol, . . .

On page 711, the second line should read, . . . to be $k_{-10} = 7.9 \times 10^5\ \text{min}^{-1}$ and . . .

On page 711, the second line following Equation (28) should read

$$\kappa_0 = 2 \times 10^{17}\ \text{min}^{-1}$$

L. L. TAVLARIDES