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ChE book reviews

Process Synthesis, D. F. Rudd, G. J. Powers, and J. Siirola, Prentice-Hall, Inc., (1973), 320 pp.

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A good textbook must effectively serve a worthwhile objective; and, even then, publication is fully justified only if either the objective itself or the treatment thereof is sufficiently unique. By these standards, Rudd, Powers, and Siirola have written a text which is not merely good, but excellent.

The authors' stated objective is to approach process development via a careful interlacing of synthesis and analysis, and "to present the material in a coherent and attractive form suitable for the students' first exposure to an engineering course". The fact that the presentation reflects the results of recent research in process synthesis makes this objective as timely as it is worthwhile.

As for uniqueness, the distinction between "design" and "synthesis" is subtle, but it is fully and effectively exploited in this text. The major concern is with those qualitative decisions which precede detailed design calculations. Process design texts, in contrast, commonly emphasize the latter and may not even mention the many prior decisions which underlie the "given" information which they present as a starting point for quantitative calculations.

The detailed and well-organized attention given the criteria for selecting a particular process scheme from among a number of possible alternatives is equally unique. Process design texts may consider various alternatives for a specific case at hand; but Rudd, et al, identify with commendable thoroughness and clarity those *general* criteria which are applicable to *all* such cases.

The major thrust of the book is embodied in separate chapters devoted to Reaction-Path Synthesis, Material Balancing and Species Allocation, Separation Technology, Separation Task Selection, and Task Integration (energy considerations, primarily). Each of these chapters develops an appropriate strategy for identifying those processing schemes which are likely to be feasible and then making a specific selection from among the several prospective alternatives.

An introductory, overall view provides some historical prospective and sets the stage for the successive consideration of the foregoing topics. The two final chapters then examine two specific applications in detail: fresh water by freezing, and detergents from petroleum.

Does the book effectively serve the authors' objective? As far as scope, thoroughness, organi-

zation, and clarity of presentation are concerned, the answer is an unqualified "Yes". The extent to which the text is, in fact, "suitable for the students' first exposure to an engineering course" necessarily depends on how it is used, however.

The authors view their approach as "a replacement for the traditional course in material and energy balancing", but admit that some traditional topics must then be treated in subsequent courses. The synthesis-oriented approach, they report, produces students who can screen reaction sequences, "make a pretty good material balance", allocate materials, select separation phenomena, and use energy balances, all with due regard for process economics, as they synthesize complete process flow sheets.

Even so, the very uniqueness of the synthesis approach makes it difficult to use this text as the basis for a conventional beginning course in stoichiometry, etc. But the book should very definitely be of interest to the instructor who is willing to accept the synthesis-oriented philosophy along with or in place of the traditional first-course approach.

As an alternative to first-course use, it is recommended that the book be seriously considered either as a text or as a key reference source for process design studies at the senior level. Decisions of the type treated by Rudd, et al, are a very real part of chemical engineering practice, and the student should be prepared to make them. *Process Synthesis* appears to be an excellent vehicle for such preparation. □