

a Mechanically Agitated Gas-Liquid Reactor," *Chem. Eng. Sci.*, **47**, 3339 (1992)

12. Levenspiel, Octave, *Chemical Reaction Engineering*, 2nd ed., Wiley, New York, NY (1972)
13. Ray, W.H., "On the Mathematical Modeling of Polymerization Reactors," *J. Macromol. Sci.-Revs. Macromol. Chem.*, **C8**, 1 (1972)
14. Biesenberger, J.A., and D.H. Sebastian, *Principles of Process Engineering*, Wiley, New York, NY (1983) □

## ChE book review

### COULSON AND RICHARDSON'S CHEMICAL ENGINEERING

Volume 6 (Design), Second Edition

by R. K. Sinnott

Pergamon Press Ltd., Oxford, UK; 954 pages, \$48.00 (1993)

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This book well serves the principal purpose of the author—to provide an undergraduate textbook for the chemical process design course. Expansions made to the first edition include an introductory presentation of process heat integration (pinch analysis), a discussion of safety and loss prevention, and a presentation of current (1992) costs related to process evaluation and step-counting techniques for fixed capital cost estimates.

The breadth of the treatment is impressive and includes mechanical design of process equipment. An extensive list of references, principally to sources in the UK and the USA, is available at the end of each chapter if additional detail is needed by the reader. The topics covered are discussed under the following chapter headings:

- Introduction to Design
- Fundamentals of Material Balances
- Fundamentals of Energy Balances
- Flow-Sheeting
- Piping and Instrumentation
- Costing and Project Evaluation
- Materials of Construction
- Design Information and Data
- Safety and Loss Prevention
- Equipment Selection, Specification, and Design
- Separation Columns (Distillation and Absorption)
- Heat-Transfer Equipment
- Mechanical Design of Process Equipment
- General Site Considerations

The book is of very high quality both in preparation and in presentation. A question that a chemical process design in-

structor might ask upon reading this text is, "Could this book be successfully used by students in my design course?" Since there are many ways to present a course in chemical process design, the answer to that question would not be an unambiguous yes or no. Some considerations include the following questions:

- *Is the volume self-sufficient?*
- *Are the topics covered current to the practice of process design?*
- *Would process costs that are presented in pounds sterling be accepted by the undergraduate audience in the USA?*
- *Does the library have resources to support access to the extensive list of references cited as publications of the IChemE (Institution of Chemical Engineers, London)?*
- *Is a sufficient supply of exercises provided for practice in the application of design techniques?*

The book is intended to be as self-sufficient as possible. The author often refers to the earlier books of the Coulson and Richardson series. For undergraduate programs that do not use that series in foundation courses, the instructor could prepare a list of equivalent references to alternate textbooks.

Current topics of design are covered in the revised edition. Topics mentioned, but not examined in detail, are batch processing and optimization. British standards and government management procedures for loss prevention are most frequently cited. Students in the USA will ask how those standards differ from USA standards and regulations, and the instructor should be prepared to answer.

The problem of converting costs from pounds sterling to American dollars is covered in detail, with examples that can be clearly understood by senior students.

A set of eight design projects is presented in Appendix G. A model answer is available in the literature for one project. There is no list of practice problems (exercises) at the end of each chapter. Fully-solved exercises are included, however, where appropriate to the presentation of topics in the book. An experienced design instructor should have no trouble in finding appropriate exercises and design projects from background. The lack of design exercises at the end of each chapter could be a more serious impediment to an instructor who wishes to rely entirely on the textbook as a source of design problems for the student.

The strengths of this book are the outstanding quality of writing, the consistent, successful effort to present technical material in the context of the process design requirement, and the breadth of coverage that results in a nearly self-sufficient textbook. It is recommended for serious consideration as a required textbook in an undergraduate process design course. □