ally transformed the design and operation of reforming units since the early 1970s. In general, the chapters on refinery processes are sequenced as organic chemistry background, followed by process descriptions and catalyst descriptions. The elements of a given process are not integrated, and the process descriptions seem to be drawn mainly from the patent literature.

Very brief descriptions of natural gas composition and purification are included, as well as petrochemicals derived from petroleum, but these sections are too short to provide more than a summary of major process steps. In chapter 19, for example, the modified Claus process for converting hydrogen sulfide to elemental sulfur is illustrated in a process block diagram, but it is not described at all in the text. Some of these shortcomings could be overcome by referring the reader to more comprehensive sources of process information.

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Bubble Column Reactors

By W.-D. Deckwer, Wiley, New York, 1991.

The bubble column appears to be a simple piece of equipment. Its basic form contains no internals or mechanical moving parts, and efficient gas-liquid contact can be obtained by virtue of the large interfacial area. However, the simplicity is deceptive. Process parameters such as the interfacial area, mass transfer coefficients, and axial dispersion coefficients are determined by very complex interactions between hydrodynamics and surface phenomena; thus, the estimation of the yield in a gas/liquid reaction, for example, is no easy matter. As the use of bubble columns has expanded in the past 20 years, there has been an enormous growth in the number of specialized research publications. These papers are, of course, well intended, but they threaten to swamp the average technical reader, particularly the engineer in industry who has a specific problem to solve in the design or operation of a bubble column.

Deckwer has come to the rescue with this well-produced book, but a word of caution is needed. The book was first published in a German edition in 1984 and the cited references listed at the end of each chapter only go up to 1982 with a few references dated 1983. The present English edition provides an Appendix of about 600 "updated references" covering the period from 1983 to 1991. These additional references are listed in relevant chapters, but are not specifically discussed in the text. Although this updated listing is useful, it should be realized that the text of the book reflects the state of the art ten years ago. For example, there is no coverage of pulsed- and reciprocating-plate bubble columns, which have received considerable attention in the last decade. Despite its lack of immediate topicality, the book fills a severe information gap for potential users of bubble columns and will help researchers and graduate students to place their ideas in the context of what has gone before.

Its chapters are grouped in three sections. Chapters 1–5 provide a descriptive introduction followed by discussion of some of the industrially important reactions that can be carried out in bubble columns, and the necessary background on gas-liquid equilibria, diffusivities, and the kinetics of absorption with reaction. The bubble-column researcher will be most interested in chapters 6 to 9, in which research results on hydrodynamics and transport phenomena in bubble columns are brought together and critically discussed. Deckwer's own very considerable contributions in this field have given him a sound basis of knowledge and authority for his critical and well-balanced review. Rather than take a "partisan" stance on rival models of axial mixing, he has sought to bring out points of agreement and consensus between them. He has tried to bring order to the contradictory data on interfacial area as measured by different methods. The final chapters (10 to 12) illustrate modeling and simulation techniques in which the earlier research results are put to work in the actual design process. Today's bubble-column designer will benefit greatly from reading these chapters, but he/she would be well advised to also check the "updated references" carefully so that more recent developments can be noted.

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Emulsion Polymer Technology

By Robert D. Athey, Jr., Marcel Dekker, New York, 1991, 320 pp., $110.00 (U.S. and Canada), $125.50 (other countries).

Emulsion polymers (polymeric lattices) are important industrial products that are often overlooked in many curricula. This may be due, in part, to the necessity of understanding both polymer chemistry and colloidal phenomena to adequately describe the behavior of lattices during both formation and processing. As a result, most of what a practitioner in this field learns they do "on the job." The author, as stated in the preface, seeks to provide a book on this topic that is a "brief reference," which "may be used by the scientist/engineer in industrial practice or as a supplementary text for the advanced student in material science, polymer chemistry, or colloid science."

The book is divided into four sections: the first contains a brief review of basic principles, the second a description of typical monomers, the third covers procedures for testing and analysis, and the fourth describes various additives to the postpolymerization product. The second and fourth sections contain a large amount of useful information for the practitioner and are by far the most valuable portions of the book. The first section contains reviews of colloidal phenomena, polymerization mechanisms, and polymerization processes. The description of colloidal phenomena is very elementary, especially that concerning ionic adsorption leading to the development of the surface charge. This portion lacks so many details that it may in fact be misleading to people not intimately familiar with adsorption phenomena.

The section on polymerization mechanisms, however, is the most deficient. While this section contains a reasonable general description of polymers and some details of other polymerization mechanisms a description of emulsion polymerization is completely lacking. Since emulsion polymerization has its own distinct kinetics, which are partially responsible for the unique properties of the final product, it is hard to understand how a book on the topic of emulsion polymers could omit such a description. In fact, Smith-Ewart kinetics are never mentioned directly (the reference to the original article appears as an unreferenced