Chemical Processing Handbook

Edited by John J. McKetta, Marcel Dekker, New York, 1993, 972 pp., $225.00

This handbook is a compilation of articles written by industry experts: most contain process description and broad economics, and some have annual production figures. The editor's preface tells us that it "covers up-to-date processing operations in the chemical industry." It goes on to say that "Each of the processing articles contains information on plant design as well as significant chemical reactions" and that "...shortcut methods of calculation are included..." along with "nomographic methods..." Only in very few of the processing chapters are there anything like "shortcut design methods" or nomographs. The plant design is mostly qualitative in nature and, in many of the chapters, even the important chemical reactions are missing. Finally, most of the chapters are hopelessly out-of-date; they are, in fact, taken without revision directly from this same editor's *Encyclopedia of Chemical Processing and Design*, most of which was prepared prior to 1980.

The contents are heavily weighted toward the petroleum industry: 14 of the 34 chapters deal directly with petroleum or natural gas processing. These include "Alkylation," "Dehydrogenation," "Gas Processing," and "Petroleum Processing"; the bulk of the information contained in these articles can be found in standard sources such as Nelson's *Petroleum Refinery Engineering*. Many others are indirectly related: these include "Oxidation of Hydrocarbons," "Bromination and Bromine Compounds," "Amination," "Esterification," "Nitration," and "Oxidation of Aromatics." Essentially all deal with hydrocarbon processing; most of this material can be found in Groggins' *Unit Processes in Organic Synthesis* in greater detail. There is nothing specific to the inorganic chemical industry (aside from a brief section on chloralkali), pharmaceuticals, propellants, detergents, foods, paper, photography or ceramics to name a few.

This is not to say that none of the contributions is worthwhile. The chapter titled "Olefin Processes" is quite complete and highly readable. "Chlorination, Liquid Phase and Vapor Phase" is very comprehensive; chemical reactions, rates and selectivity are all well described. "Hydrogenation Catalysts," written by the group at IFP in France, contains a good discussion of the tradeoff considerations for the use of palladium-based catalysts. The chapter written by the group at UOP on isomerization has mechanisms, plant layouts, and economics not found elsewhere. "Polymerization" is a reasonable mix of simple theory, application and practice. As an example of the haphazard editing, however, this chapter includes work on emulsion polymerization, yet it is followed by a chapter titled "Polymerization, Emulsion." More discussion of polymerization occurs in the chapter titled "Chemicals from Petroleum." Another example is the chapter titled "Catalysis and Catalysts," which includes material on precious metals, but is followed by "Precious Metals Catalysis." Many of the other chapters include description both of the theory and practice of the catalysts used in the process considered.

The most important deficit is the outdated nature of most of the contributions; one runs into such phrases as "If the North Sea gas contains significant ethane..." and "Of technical importance is the preparation of DDT..." Technologies developed in the last ten or 15 years are almost entirely absent. There is not to be found any mention of the replacements for the Freons, nonlead antiknock agents for gasoline, waste treatment and recovery technologies. The chapter on Enzyme Processing was written in 1979, so that virtually an entire industry has been excluded.

On the positive side, the format is very readable, with excellent typesetting, figures and tables. But the contents are available in standard sources such as those mentioned, in addition to Shreve's *Chemical Process Industries*, so that this handbook is not recommended for any purpose.

Jack Winnick
School of Chemical Engineering
Georgia Institute of Technology
Atlanta, GA 30332

Physical Forces and the Mammalian Cell

Edited by J. A. Frangos, Academic Press, 1993, 400 pp.

Perhaps the most convenient entree for engineers into the world of mammalian cell biology, motivated by bioprocessing and health care applications, has been the study of effects of mechanical forces on cell function. Engineers are obviously well prepared to apply experimental devices and theoretical analyses for quantifying fluid mechanical forces on cells, whether attached to surfaces or free in suspension. Coupling these standard engineering methods to measurements of various cell functions, such as proliferation, protein production, adhesion, or merely maintenance of viability, allows generation of tremendous amounts of information for the numerous possible combinations of cell type, cell function, and mechanical environment. Indeed, so much information has accumulated during the roughly two decades of research in this area that the availability of a comprehensive summary and review is highly desirable.

This multiauthor volume provides a useful compendium of engineering studies of how mammalian cells are affected by mechanical forces, primarily those induced by moving fluids. In the context of this review for a chemical engineering journal, it is intriguing that only four of the 11 chapters are written by chemical engineers, although the editor is Profes-