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BOOK REVIEW

Chemistry of Catalytic Processes. By BRUCE C. GATES, JAMES R. KATZER, AND G. C. A. SCHUIT. McGraw-Hill, New York, 1979. 464 pp., $28.50.

"Chemistry of Catalytic Processes" may be more clearly identified as a textbook than a reference book, although it will serve both purposes. Its unique format sets it apart from other books on heterogeneous catalysis. It is organized around four industrial catalytic processes (cracking, reforming, partial oxidation of hydrocarbons, and hydrodesulfurization) and a fifth chapter on the class of industrial processes utilizing transition metal complex catalysts. The latter chapter describes processes for ethylene oxidation to acetaldehyde (Wacker process), vinyl acetate synthesis, hydroformylation of olefins (Oxo process), methanol carbonylation, and stereospecific polymerization of α-olefins (Ziegler–Natta process). The ammoxidation of propylene is covered in detail in the chapter on partial oxidation. The chapters more or less follow the same format with sections on process description, catalysts and catalytic chemistry, and process engineering. Each chapter is accompanied by a list of about 20 problems, most drawing on real experimental data and sufficiently challenging to be a useful learning tool.

The book contains a fair component of reaction engineering in the form of descriptions of the processes as currently practiced and elementary process design considerations. The descriptions of process engineering are brief but quantitative examples are presented for cracking, reforming, and multiphase reactors of the kind used for homogeneous catalysts. Adequate references direct the interested reader to the well-developed literature on mass transfer constraints on the design of catalytic reactors.

As indicated in the title, the strong suit was intended to be chemistry and this is the case. There is a strong component of mechanistic organic chemistry, chemical bonding, and structural inorganic chemistry. The rich carbonium ion chemistry of catalytic cracking, the ligand bonding theory of metal complex catalysts, and the complicated structures of partial oxidation catalysts, respectively, are appropriate illustrations of this attribute. Each topic is well presented but integrated within a particular catalytic process discussion. Most modern techniques of surface characterization and theoretical descriptions of small particles, alloys, surface bonding, etc. are at least mentioned and referenced.

I believe that "Chemistry of Catalytic Processes" will become a widely used text because it recognizes contributions to catalysis from across the spectrum —surface science to reaction engineering—but keeps catalytic *chemistry* as the heart of the matter, and because it discusses catalytic chemistry in the context of the process in which the catalysts are used so that the reader does not lose sight of the dual goal of fundamental understanding and the development of new or improved catalysts. The latter is analogous to locating the exploratory research laboratory with a view of the refinery!

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