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BOOK REVIEW

The Bioorganic Chemistry of Enzymatic Catalysis. By MYRON L. BENDER, RAYMOND J. BERGERON, AND MAKATO KOMIYAMA. Wiley, New York, 1984. 312 pp. $39.50.

This is an excellent text for advanced undergraduate and beginning graduate students interested in understanding physical organic chemistry and how it applies to biological reaction mechanisms. This text is an updated version of its predecessor, "Mechanisms of Homogeneous Catalysis from Proton to Proteins," M. L. Bender, Wiley, New York, 1971, and incorporates the early work's desirable features. The numerous figures, schemes, equations, and structures illustrate quite well the points made in the text. Most of the tables contain classifications of reaction mechanisms, catalyst types, or summaries of data. In addition, material in the text is often enumerated, which helps to clarify the presentation. The material is well written and lucidly presented, and references are provided for readers interested in more detailed discussion. The authors have done a masterful job in condensing and summarizing a vast array of material in only 312 pages.

Another strength of the text is the organization of topics. After a brief introduction of catalysis in Chapter 1, there is a discussion of proton transfer in Chapter 2 beginning with hydronium and hydroxide ions and ending with enzymatic reactions. Salt and solvent effects are grouped under catalysis by fields in Chapter 3. The next three chapters are devoted to acid-base catalysis. Hydronium and hydroxide ion catalyses are covered in Chapter 4 starting with pH-rate profiles and acidity functions and ending with catalytic mechanisms. General acid-base catalysis in organic reactions is presented in Chapter 6 starting with Bronsted and ending with Jencks' susceptibility to catalysis. In between, there is excellent discussion of enforced acid-base catalysis. General acid-base catalysis of enzymatic reactions is discussed in Chapter 6 by classes of enzymes. Nucleophilic and electrophilic catalyses are presented in Chapter 7 by type of nucleophile and electrophile. The discussion of coenzymes in Chapter 8 is divided into redox and nonredox systems. In Chapter 9, metal ion catalysis is covered in a similar way with the major classes: superacid catalysis and catalysis by redox. This is one of the few texts in organic or biochemistry that covers this topic. The presentation of intramolecular catalysis in Chapter 10 is focused on the unique role these reactions have played as models for enzymatic accelerations. The functional group approach within the context of acid-base or nucleophilic–electrophilic catalysis is followed. In Chapter 11, multiple catalysis is presented as a "vexing mechanistic question," easy to postulate but difficult to justify. Discussion of the catalysis by complexation in Chapter 12 is divided into three major sections: theory of acceleration due to complexation, covalent complexes, and noncovalent complexes. There is also an excellent discussion of cyclodextrin chemistry.

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This book should find a niche as a text for mechanistic bioorganic chemistry. Beginning students will find the text useful because of its organized approach. The experienced researcher may also find the book valuable because of its insight into catalysis. On this basis alone, the book belongs in the library of all researchers interested in organic or enzymatic mechanisms.

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