

Dan Purich (Author): *Enzyme Kinetics: Catalysis & Control: A Reference of Theory and Best-Practice Methods*

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There is a danger of shock upon picking up *Enzyme Kinetics; Catalysis and Control* and realizing that it is almost 900 pages long. How much enzyme kinetics could there possibly be, or, more to the point, how much enzyme kinetics does one really need? The prospect of leafing through page after page of algebraic equations and double reciprocal plots can cause sweaty palms in even the most hardened enzymologist. Panic wanes in the reader of *Enzyme Kinetics*, however, when it becomes apparent that kinetics is only a portion of the material that is presented. In fact, reading the book is downright enjoyable because the author, Daniel Purich, has written an engaging, wide-ranging book that covers many topics beyond the purview of kinetics as it is usually defined.

If the title *Enzyme Kinetics* is something of a misnomer, the sub-title, *A Reference of Theory and Best Practice Methods* is not. This book is not designed to be used as a textbook and the broad range of topics that are covered warrants the classification as a reference. The level at which chemical concepts are presented is appropriate for advanced students in biochemistry or chemistry; mathematical explanations sometimes rely on linear algebra and calculus. In addition to detailed sections covering standard topics in steady-state kinetics such as derivation of rate equations and kinetics of inhibitors and multisubstrate reactions, the book includes sections on practical topics such as how to design an assay, how to design and interpret site-directed mutagenesis experiments, and how to apply different isotope exchange techniques. A welcome component of the book is a discussion of the different software

packages that are available for data analysis, including global fitting software packages used for transient-state kinetic data. In contrast to many books devoted to enzyme kinetics, Purich devotes considerable space to discussions of the basic chemistry that underlies many enzymatic reactions or the techniques used to monitor them. Thus, one finds a brief introduction to coordination chemistry and to the different classes of covalent bond-making and -breaking reactions in the chapter entitled “Active Sites and their Chemical Properties”. Discussions of kinetic experiments treat both introductory considerations (for fluorescence measurements: “Step 1. Place a fluorescence cuvette containing an adequate volume of sample within the instrument”) and more sophisticated topics such as the proper statistical analysis of kinetic data, and the different methods used in single-molecule kinetic studies. There is a great deal of useful practical information to be found throughout the book, including discussions of using engineered phosphate-binding protein for continuous fluorescence-based assays of P_i and PP_i ; how to account for metal complexation by ATP; and how to regenerate nucleoside triphosphates.

The treatment of steady-state kinetics is comprehensive enough for most practicing biochemists, but not as encyclopedic as that found in Segal's tome which is familiar to most enzymologists. The underappreciated topic of pH dependence of kinetic parameters is covered rather more briefly than its utility warrants. On the other hand, the explanations of rate equation derivation are clear and concise, and a nice introduction is given to kinetic isotope effects and quantum mechanical tunneling. The final two chapters of the book discuss single-molecule enzyme kinetics and mechanoenzymes. The inclusion of these and other diverse topics serves to separate Purich's book from other books that focus more narrowly on steady-state

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kinetics. *Enzyme Kinetics* provides an introduction to enzyme electrodes, for example, and how many other enzyme kinetics treatises discuss the kinetic properties of enzymes tethered to flow cells?

One of the great strengths of this book is that the voice of the author comes through on every page. He does not simply list different methods for rate equation derivation, for example, but comments on the situations to which each is best suited. Chapter One includes a scolding of the Nobel Prize committee for overlooking Britton Chance's contributions to science. Critical evaluations of published experimental data and alternative explanations are presented. Articulate arguments for the importance of continued research in enzymology are offered, and there is a thoughtful discussion of how pharmacologically useful compounds are developed. Above all, the people who have conducted the research upon which the book is based are recognized. The list of researchers who "made advances so notable that they personify the field" provides plenty of fodder for late night discussions at the Enzymes Gordon Conference. Whether one agrees with all of Purich's judgements or not, their inclusion makes reading his book

very enjoyable, and also documents his deep familiarity with and affection for the field.

With all of these positive attributes, it is unfortunate that the publisher did not put as much care into the production of *Enzyme Kinetics* as the author did in its writing. The binding on this reviewer's copy of the book began to disintegrate within two weeks. *Enzyme Kinetics* is a book that should live in the lab and be passed around, but it is unlikely to survive such treatment for long. It seems churlish to mention, but the number of typographical errors is astounding. The typos in the text are annoying, and the errors in the figures are potentially confusing. More seriously, the errors in the discussions of rate equation derivation are substantive enough that they could limit the utility of the section.

That caveat notwithstanding, this is an excellent book. It is difficult to pick it up without finding something new, interesting, and useful. The breadth of coverage and the author's familiarity with disparate topics are impressive, and the references both to published work and to web-based resources are up to date so that one can jump into the primary literature as necessary.