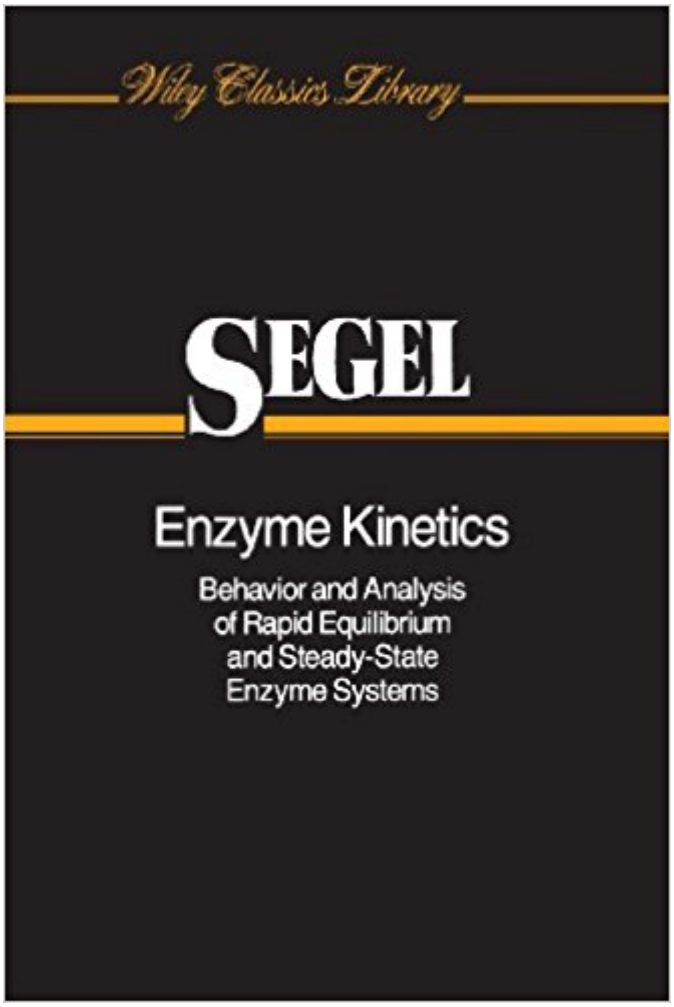
Enzyme Kinetics: Behavior And Analysis Of Rapid Equilibrium And Steady-State Enzyme Systems



Synopsis

Covers enzyme kinetics from its most elementary aspects to such modern subjects as steady-state, multi-reactant kinetics and isotope exchange. Offers an understanding of the behavior of enzyme systems and the diagnostic tools used to characterize them and determine kinetic mechanisms. Illustrates and explains current subjects such as cumulative, concerted and cooperative feedback inhibition and metal ion activation.

Book Information

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Customer Reviews

Irwin Segel wrote his book in 1974, but it was reprinted (without revision) in 1993 and remains available, still apparently selling steadily.The main thing that will strike any reader coming to this book for the first time is that at nearly 1000 pages it is far longer than any of its competitors. Chapter 9, which gives a blow-by-blow account of all the multireactant mechanisms that the author could think of, accounts for 340 pages all by itself, making it considerably longer than Alejandro Marangoni’s whole book "Enzyme Kinetics: a modern approach", also published by Wiley, but in 2003. The problem with this approach, it seems to me, is that nature does not provide examples of all the kinds of behaviour that Segel can think of, but does provide examples of some kinds of behaviour that he does not mention, such as kinetic cooperativity (i.e. cooperativity that cannot be attributed to interactions between two or more catalytic sites). For that reason, I think that any attempt to treat the subject in an encyclopaedic fashion must ultimately fail.Experts in fast-reaction kinetics (which I am not) typically classify textbooks of enzyme kinetics into ones that treat fast

reactions badly and ones that don’t treat them at all. Segel’s book comes into the latter category, and that is perhaps a virtue. For the first 942 pages one might think that he had made the same choice over statistical treatment of data, but then at the very end there are two pages that have all the apearance of an afterthought. Until then, all of the many figures either show no experimental points, or they show points that lie exactly on the lines they are supposed to fit. About the two-page Appendix itself, perhaps the less said the better.Having said that, there is also plenty to like in Segel’s book. If you need information on points that lend themselves to the encyclopaedic approach -- for example if you want to track down one of the many graphical methods for analysing kinetic data that appeared between 1950 and 1975 -- then this is the first and most convenient place to look.

Do not buy this book. I have been doing enzymology, enzyme assays and enzyme kinetics extensively for 21 years. There are lots of bad papers published in enzyme kinetics, and I had displeasure of reviewing many of them. All too often, the bad papers have their roots in Segel’s book. NaÃƒÂ ve fools that do not understand the basic premises behind steady state equations (and enzyme kinetics in general) use Segel’s book as "a catalogue of equations" trying to force their data to some of the Segel’s models. Such incompetence has a simple result: the experiments are designed badly, the data are presented badly and the conclusions and the reported values are of the mark. This is specially valid for the nucleic acid enzymology, allosteric enzymes, and complex enzymes that have slow turnover rates and/or nonlinear product formation (i.e. pre-steady state burst, enzyme hysteresis, product inhibition, multiple substrates or products, or processivity).Segel’s book has over 1000 pages, the print is painfully spread out, it is tedious to flip through so many pages. The basic principles are covered poorly, there is no pre-steady state kinetics (so the novice do not have idea about its importance), nothing is said about assay design, and there is no mention of many complex but common phenomena such as processivity, or membrane proteins. The book is painfully out of touch with the fact that these days all of us have computers on our desktops (the double reciprocal plots are 1931 technology). I heard that Segel forces his students to buy this book, this can explain why so many of them have been sold. The proponents of the Segel’s book often argue that the book is so easy and so rich in models. I would say: yes it is as easy as "do-it-yourself brain surgery". If you want to learn a real enzyme kinetics my advice is: take Alan Fersht’s book, GEPASI or KinSim programs, and be sure that you understand the major premises in the experimental design. Otherwise consult a proven expert. Incompetence in enzyme kinetics is all to common in the published papers. As a result, we are now in situation that today many of the

researchers do not believe in the enzyme kinetics anymore. It is not the enzyme kinetics that is stupid, it is the incompetence that makes the enzyme kinetics look stupid.

At least one author of a poor review in these comments of this book complains that people employ results from Segel's book without following their derivation to understand their applicability. That is a criticism of the people who read and use the book, and not of the book itself.As it stands, Segel's book is an excellent resource into mathematical modeling of enzyme systems under constraints mentioned even in the books title: rapid [chemical] equilibrium and steady-state systems! While it is true that some features of transcription and other enzyme systems exhibit interesting phenomena that is not yet entirely understood, that is absolutely no limitation on creating a minimal model of these processes, which may well-approximate yields under approximate "equilibrium" conditions. There is much literature supporting the rapid equilibrium hypothesis in vivo.Not just because of its breadth, this book is an excellent resource for the bookshelf of anyone working in mathematical modeling of biological systems; however, as mentioned in other comments, care should be taken when using results from this book. As with any mathematical expression, this book is mostly a guide for deriving equations for product yields under specific conditions.

This book was introduced to me by my professor in a graduate level protein biochemistry course - that was almost 30 years ago. It still is useful for those studying the enzyme/metabolic aspects of biochemistry. In an era where most of the chemistry has disappeared from the undergraduate biochemistry textbooks (or has been dumbed-down), this Segel's classic and his book on Biochemical Calculations remain as mainstays for those who study the "harder" aspects of biochemistry.

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