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The book is intended to provide a sound basis for enzyme reactor design based on kinetic principles, and give an updated vision of the potentials and limitations of enzyme biocatalysis, especially with respect to recent applications in processes of organic synthesis. The book is structured in the form of a textbook that goes from basic principles of enzyme structure and function to reactor design for homogeneous systems with soluble enzymes, and heterogeneous systems with insolubilized enzymes. It contains an introductory chapter that gives an updated overview of enzyme technology, a chapter on enzyme production focused on large-scale operations, two chapters devoted to homogeneous and heterogeneous enzyme kinetics and a chapter on enzyme reactor design and operation based on enzyme kinetics principles, mass transfer limitations and enzyme inactivation. The book is complemented with case studies of biocatalytic processes of industrial relevance or potential, written by experts in those fields. Applications of proteases, acylases, lipases, aldolases and dehydrogenases in reactions of organic synthesis, and peroxidases in the degradation of recalcitrant organic compounds, are used as selected examples to illustrate the realities and potentials of enzymes as process