J. Tao, R. J. Kazlauskas: Biocatalysis for Green Chemistry and Chemical Process Development

Wiley, London, 2011, ISBN: 978-0-470-43778-0. Copyright: August 2011.

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Received: 17 April 2013 / Accepted: 30 May 2013 / Published online: 18 June 2013
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White Biotechnology is certainly one of the most promising technologies for the chemical industry of the twenty-first century. Using biocatalysts may significantly improve a broad range of chemical processes in terms of production efficiency, product quality and environmental footprint.

The book 'Biocatalysis for Green Chemistry and Chemical Process development' summarizes the state of the art and most important developments of this highly dynamic field. In four sections the reader is introduced to the current trends.

Part one lays the basis for the economic and environmental evaluation of (bio) catalytic processes endowing the reader with the tools and basic knowledge to assess the processes discussed in the following sections. The different metrics of Green Chemistry are discussed in detail.

The other sections illuminate current White Biotechnology utilizing various case studies. The methodological diversity ranging from isolated enzymes to engineered microorganisms is covered. Part two focuses on biocatalysis for the synthesis of high-value added compounds such as chiral active pharmaceutical intermediates (APIs). The examples include industrial processes with redox- and oxy-functionalization chemistry, C–C bond formation and examples for (dynamic) kinetic resolutions. Additionally therapeutic proteins and metabolic engineering for terpene synthesis are discussed. In part three, the biocatalytic synthesis of non-API fine chemicals is discussed utilizing various case studies. The uses of various enzyme classes and methodologies (such as whole cells and isolated enzymes) are presented for different chemical sectors. The

last part is devoted to the emerging field of biorenewables-based chemicals and polymers obtained via biocatalysis.

The book is structured according to product classes and chemical industry sectors. This focus on the products rather than biocatalyst(s) used is consistent with a chemists' way of thinking. The same is true for the way the examples are presented: a wealth of chemical reaction schemes illustrates the processes described thereby making the content easily accessible to a chemist. Biochemical details on enzyme structure and mechanism are rather scarce. Therefore this book will appeal mostly to preparative organic chemists interested in practical applications of biocatalysis. Nevertheless the book will also be of interest for readers with a more 'bio-background' seeking an overview over the diversity of products that can be obtained via biocatalysis.

The book represents a collection of individual review contributions from leading experts from academic research and industry. The high quality of the contributors guarantees up to date and precise presentation of the relevant facts. Every chapter can be read as a stand-alone contribution. This leads to minor redundancy between chapters, but this does not impair the overall high quality. Every chapter is heavily referenced giving the reader the possibility to learn more about specific topics of interest.

Whereas possible, the bioprocesses are compared to their chemical counterparts in terms of eco-efficiency and economic feasibility. A range of tables compare eco-efficiency indicators such as energy demand, resources consumed and wastes produced by different approaches. Thereby, a significant step beyond the mere qualitative discussion of the 12 Principles of Green Chemistry, towards quantification of the green potential of biocatalysis is emphasized.

Therefore, this book is a valuable compendium for researchers and users of biocatalysis from both, the academic and the industrial world.

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