Journal of
Biomolecules and Biochemistry

Abstract

Optimisation of enzymes and chemo-enzymatic processes for the synthesis of pharmaceuticals and fine chemicals

Henryk M. Kalisz

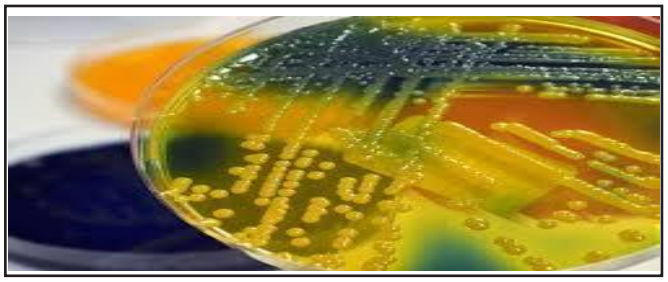
Abstract:

Biocatalysis plays an important role in a wide range of industries, including food and feed, personal care, textiles, detergents, fine chemicals and pharmaceuticals. The increased availability of customised enzymes for use in fine chemical synthesis is making biocatalysis increasingly attractive for the production of chiral pharmaceutical intermediates and APIs, due to the high enantio- and regioselectivity of enzymes, leading to higher yields of the required enantiomer. Consequently, chemo-enzymatic processes are often applied for the synthesis of single enantiomers of drug internediates or APIs. The use of enzymes to replace multi-step complex steps in the synthesis of pharmaceuticals thus helps to reduce the number of steps required to generate the final chiral product and also helps to reduce costs, side products and wastes of the process.

The properties of many enzymes used in these processes have been improved by engineering methods. One recent technology used for the engineering of tailor-made enzymes involves the application of a proprietary enzyme design platform overcoming key efficiency bottlenecks in statistical structure-dynamics analysis and enabling the streamlined functional clustering of protein sequence space. This powerful technique allows the fast and reliable identification and subsequent engineering of hotspots in a protein, resulting in a rapid and inexpensive improvement of enzyme properties, such as chirality, catalytic activity, stability, substrate specificity, stereoselectivity. This presentation seeks to provide a description of this enzyme design technology and to provide examples of chemo-enzymatic processes used in the synthesis of pharmaceutical products.

Biography:

Henryk Kalisz obtained his PhD in Biochemistry at Manchester University and did his postdoctorate at the University of Freiburg, Germany. He has over 30 years of experience in industrial enzymology and biotechnology and has published over 60 papers in reputed scientific



journals. His work career includes 14 years at the G.B.F., Braunschweig, Germany, 7 years at Pharmacia, Nerviano, Italy, as Head of Biochemistry, and 4 years as Chief Scientific Officer at Eucodis Bioscience in Vienna, Austria. Since October 2011 he has been applying his expertise in industrial enzymology as a consultant and independent representative to provide scientific and technological advice and assistance to various Biotechnology and Pharmaceuticals organizations.

Publication of speakers:

1. Singh R, Kumar M, Mittal A, Kumar Mehta P. Microbial enzymes: industrial progress in 21st
2. century. 3 Biotech 2016; 6(2):174
3. 2 Sharma K, Beniwal V (2014). Industrial Enzymes: Trends, Scope, and Relevance. Nova Science
4. Publishers, Inc.
5. 3 Chapman J, Ismail AE, Dinu CZ. Industrial Applications of Enzymes: Recent Advances,
6. Techniques, and Outlooks. Catalysts 2018; 8:238
7. 4 Tuck CO, Pérez E, Horváth IT, Sheldon RA, Poliakoff M. Valorization of Biomass: Deriving
8. More Value from Waste. Science 2012; 337: 695–699
9. 5 Rosales-Calderon O, Arantes V. A review on commercial-scale high-value products that can be
10. produced alongside cellulosic ethanol. Biotechnol Biofuels 2019; 12:240

Citation: Henryk M. Kalisz; Optimisation of enzymes and chemo-enzymatic processes for the synthesis of pharmaceuticals and fine chemicals; Microbiology and Biotechnology 2020; June 26, 2020; France Time Zone