



Enzyme characterisation in microreactors by multivariate data analysis

Ringborg, Rolf Hoffmeyer; Krühne, Ulrich; Woodley, John

Publication date:
2014

Document Version
Publisher's PDF, also known as Version of record

[Link back to DTU Orbit](#)

Citation (APA):

Ringborg, R. H., Krühne, U., & Woodley, J. (2014). *Enzyme characterisation in microreactors by multivariate data analysis*. Abstract from 13th International Conferences on MicroREAction Technology, Budapest, Hungary.

General rights

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

ENZYME CHARACTERISATION IN MICROREACTORS BY MULTIVARIATE DATA ANALYSIS

Rolf H. Ringborg¹ – Ulrich Krühne¹ – John M. Woodley¹

¹ Department of Chemical and Biochemical Engineering, Technical University of Denmark, 2800 Kgs. Lyngby, Denmark, E-mail: Rolri@kt.dtu.dk

Keywords: Enzymes, Microreactor, UV, spectroscopy, Enzyme Characterization, Enzyme Kinetics.

Characterization of new enzymatic mutants is currently time consuming and requires a high degree of knowledge to understand and interpret the enzymatic performance correctly. Clearly, it would be good to accelerate the development of biocatalysis for industrial use and one way to do that is by rapid characterization. As an example ω -transaminase is here investigated, which facilitates the exchange of an amine- and keto-group stereoselectively, see Figure 1.

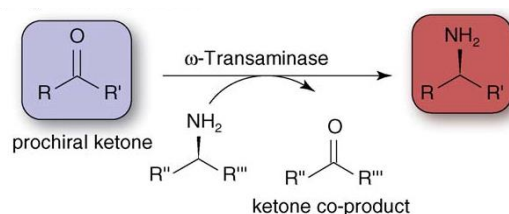


Figure 1 - Asymmetric synthesis of prochiral ketones [1]

Enzyme characterization is considered in the form of taking a picture, this will include studying the effect on initial rate of pH, Enzyme, Substrate, co-Substrate, Product and co-Product concentration [2]. From this investigation, it will be possible to determine whether the enzyme meets the criteria for scale-up or not. The characterization will be carried out in a microreactor [3], this size is ideal since the enzyme resource is scarce at this point of development and currently the only concept that facilitates this analysis. It will therefore be possible to investigate the biocatalyst thoroughly with only small quantities of enzyme consumed. In the case where the reaction operates with UV active components, UV can be used to detect compounds with high sensitivity supplemented by multivariate data analysis where the spectra can be decorrelated to yield concentrations of individual compounds. HPLC systems are built for handling small quantities of liquids and the UV detectors for these proves to be fitting excellent. Enzyme characterization will therefore be carried out by combination of a microreactor with a diode array detector from an HPLC system.

References:

1. D. Koszelewski, K. Tauber, K. Faber and W. Kroutil, " ω -Transaminases for the synthesis of non-racemic α -chiral primary amines" Trends in Biotechnology, 28, pp. 324-332, 2010
2. N. Al-haque, P. A. Santacoloma, W. Neto, P. Tufvesson, R. Gani and J. M. Woodley, "A Robust Methodology for Kinetic Model Parameter Estimation for Biocatalytic Reactions" Biotechnol. Prog., 28, No. 5, pp. 1186-1196, 2012
3. U. Krühne, S. Heintz, R. Ringborg, I. P. Rosinha, P. Tufvesson, K. V. Gernaey and J. M. Woodley, "Biocatalytic process development using microfluidic miniaturized systems", Green Process Synth., 3, pp. 23-31, 2014