Evaluating the impact of substrate and product concentration on a whole-cell biocatalyst during a Baeyer-Villiger reaction - DTU Orbit (16/12/2018)

The presence of high concentrations of substrate or product may impede the optimal functioning of a biocatalyst, more so in the case of whole cell biocatalysts where the metabolic status of the cells may be compromised. In this article we investigate these effects using as an example the Baeyer-Villiger oxidation of racemic bicyclo[3.2.0]hept-2-en-6-one to yield (+)-1(S),5(R)-2-oxabicyclo[3.3.0]oct-6-en-3-one and (+)-1(R),5(S)-3-oxabicyclo[3.3.0]oct-6-en-2-one by CHMO expressed in Escherichia coli TOP10. Multi parameter flow cytometry was used to illustrate that substrate (racemic bicyclo[3.2.0]hept-2-en-6-one) associated cell damage was concentration dependent. One of the two regio-isomeric products [(−)-1(S),5(R)-2-oxabicyclo[3.3.0]oct-6-en-3-one] was also used to identify that product associated cell damage was time dependent. In addition, both substrate and product concentrations affected the observed reaction rate.

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