CATALYTIC SEMIPERMEABLE MEMBRANE - CHALLENGE AND POSSIBILITIES

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Abstract

Equations describing a multi-phase bioreactor with a catalytic membrane located on the boundary of phases, of which one is a substrate reservoir, are formulated. A model analysis of the process was carried out and the effect of main operating parameters of such a reactor, i.e. the catalytic layer thickness and the coefficients of diffusion mass transport in both phases, was determined.

Two periods with different methods of supplying the catalytic layer can be distinguished in the process. There is also a characteristic thickness of the catalyst layer and when it is exceeded the process duration is no longer shortened although not always full substrate conversion from the supply stream has a place. It is recommended to apply thin layers, because then the catalyst activity is fully used.

The analyse of the influence of mass transfer showed that substrate mass transfer in acceptor phase to the catalyst layer has a slight effect on the process rate when the intensification of its transfer in donor phase could have a significance influence on process rate.

K e y w o r d s: biocatalyst layer, catalytic membrane, process modelling, multi-phase reactor