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Engineering aspects of Penicillin G transfer and conversion to 6-Aminopenicillanic acid in bioreactor with mobile bed of immobilized penicillin amidase,

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Abstract

The paper presents the studies on the external and internal mass transfers of Penicillin G for 6-Aminopenicillanic acid enzymatic production using a bioreactor with stirred bed of immobilized *penicillin amidase*. By means of the substrate mass balance for a single particle of biocatalysts and considering the kinetic model adapted for competitive and non-competitive inhibitions, specific mathematical models have been developed for describing the profiles of Penicillin G concentration in the outer and inner regions of biocatalysts and for estimating its mass flows in the liquid boundary layer surrounding the particle and inside the particle. The values of the mass flows are significantly influenced by the internal diffusion velocity and rate of the enzymatic conversion of substrate. These cumulated influences led to the appearance of an enzymatic inactive region near the particle center, its magnitude varying from 0 to 9.2% of the overall volume of particles.

Keywords: 6-aminopenicillanic acid, stirred bioreactor, immobilized enzyme, penicillin amidase, mass transfer, diffusion