



EFFECT OF INTERNAL DIFFUSION ON BIOETHANOL PRODUCTION IN A BIOREACTOR WITH YEAST CELLS IMMOBILIZED ON MOBILE BEDS

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Abstract

This paper develops the previous studies on the transfer processes and biochemical reaction kinetics involved in the bioethanol production by immobilized *S. cerevisiae* cells using a bioreactor with mobile beds of biocatalysts. Although the immobilization of cells or enzymes offers a lot of advantages compared to the free ones, it induces the appearance of the internal diffusion of substrate or product, with negative effect on the overall biochemical process. In the investigated case, the influences of the substrate internal diffusion on physical and biochemical processes have been quantified by means of the Biot number, Thiele modulus and reduction factor λ . The biocatalyst particles size and volumetric fraction exhibit significant and different influences on these three parameters. The increase of particle diameter led to the increase of Bi number, to the decrease of Thiele modulus and to the decrease of factor λ , but the influence of biocatalysts concentration is favorable for all discussed parameters.

Key words: bioethanol, immobilized cells, inhibition, internal diffusion, mobile bed bioreactor

Received: March, 2010; *Revised final:* April 2010; *Accepted:* May, 2010

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