



ANALYSIS OF DISTRIBUTION OF OXYGEN TRANSFER RATE IN STIRRED BIOREACTORS FOR BACTERIAL BROTHS

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Abstract

The study on the distribution of oxygen transfer rate in a stirred bioreactor for *Propionibacterium shermanii* broths underlined the major influence of the presence and concentration of biomass on the interphasic transfer of oxygen. Owing to the bubbles surface blockage by the bacterial cells, the accumulation of biomass from 30.5 to 120.5 g/l d.w. led to the decreasing of k_La for about 1.3-2.4 times. Compared with the simulated broths without biomass having similar apparent viscosity, the oxygen transfer rate became for about 1.22-4.54 times lower in the bacterial broths. The intensification of aeration promoted the acceleration of oxygen transfer for about 1.2-1.9 times, due to the intensification of turbulence and of the extent of free interfacial area needed for the oxygen transfer, this influence being similar to that recorded for the mixing efficiency. Moreover, the increase of aeration rate led to the increase of oxygen transfer efficiency. Indifferent of the operating parameters of the bioreactor, k_La increased from the inferior region to the superior one, being nonuniformly distributed inside the broths.

Key words: k_La , mass transfer, mass transfer coefficient, *Propionibacterium shermanii*, specific power input, stirred bioreactor, superficial air velocity.

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