

Investigation of Growth Acceleration Factors of *E. coli* ET2174 by Use of DO Signal

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Abstract

Specific growth rate of *E. coli* AT2471 was estimated by on-line monitoring of DO level. The following results were obtained. Amino acid content of preculture medium was the sole reason for the two stages growth of recombinant strain *E. coli* AT2471. The experiment of on an individual amino acid influence showed that the addition of most acids contained in the preculture medium, except valine, cysteine and methionine, have neither beneficial nor negative effects on the cell growth. Valine stopped the cell growth and addition of isoleucine could reduce this negative effect. Addition of cysteine to the medium increased specific growth rate of cells from 0.49 h^{-1} to 0.62 h^{-1} ; methionine addition increased it to 0.69 h^{-1} . The combination of these two amino acids enhanced cell growth resulting in a high value of μ 0.91 h^{-1} .

Key words: *E. coli* AT2471, two stages, growth, DO, specific growth rate, amino acids

Introduction

Microbial production of phenylalanine is known to be a process of low efficiency because of the considerable amount of energy required by the cells for phenylalanine synthesis (Hermann, 1987). To make the process profitable, special efforts have been focused on the improvement of this efficiency, which is usually expressed in terms of phenylalanine yield, absolute phenylalanine concentration and productivity. So far, it has been

found that several factors affect phenylalanine synthesis, and their influences have been studied in the cases of different products (Konstantinov, 1991). Phenylalanine synthesis is depends on various phenomena. As a result of several investigations the phenylalanine concentration, production rate and production yield based on the amount of glucose consumed were improved to 17g/l , 0.3g/l/h and 18% , respectively (Takagi, 1996). For high productivity it is essential to keep the specific growth rate of cells at the high rate during cultivation.

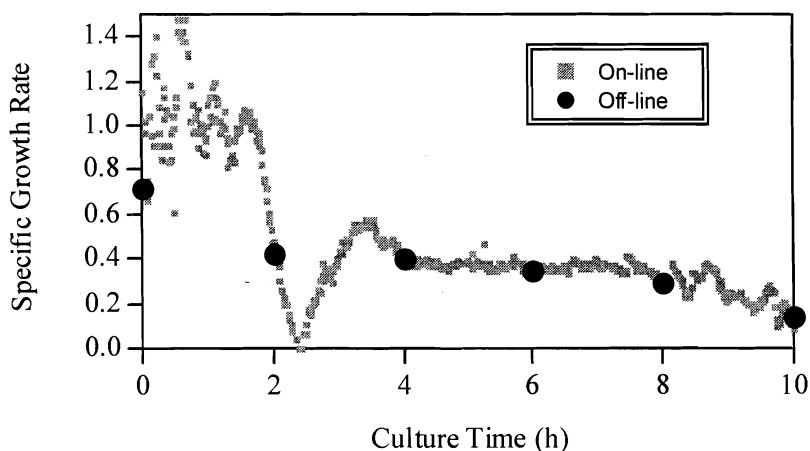


Fig. 1. Time course of specific growth rate of recombinant *E. coli* AT2471. (On-line) Specific growth rate measured with on-line laser turbid sensor (Off-line) Specific growth rate measured by using off-line sample