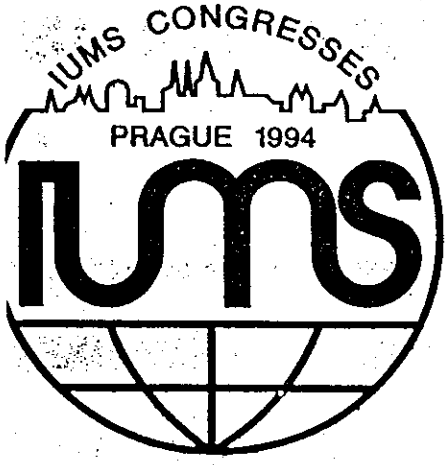

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ABSTRACT BOOK

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EFFECT OF BIOGENIC AND ABIOGENIC ORGANIC ACIDS ON THE GROWTH RATE OF *CLOSTRIDIUM ACETOBUTYLICUM* ATCC 824. I. Vasconcelos[1], J. C. Andrade[1], P. Soucaille[2], [1]Escola Superior de Biotecnologia, R. Dr. António Bernardino de Almeida, 4200 Porto, Portugal, [2]Département de Génie Biochimique et Alimentaire, I.N.S.A., Av. de Rangueil, 31077 Toulouse cédex, France

Organic acids, such as acetic and butyric, play an important role in acetone-butanol fermentation, mainly because they contibute to the ionic equilibria of the medium and they have an inhibitory effect on growth. The exact mechanism by which acids inhibit bacterial growth is not completely understood. Thus, it seems interesting to compare the effects of biogenic (acetic and butyric) and abiogenic (propionic, valeric and hexanoic) acids on the growth rate of *Clostridium acetobutylicum* ATCC 824.

The inhibitory effect of these acids was studied in batch cultures with uncontrolled pH. An ammonium salt of the corresponding acid was added to a synthetic medium with glucose as carbon source, growth being monitored by direct optical density measurements.

A threshold concentration (P_0) had to be reached before growth inhibition occured. P_0 values ranged from 58 mM, for acetic acid, to less than 1 mM, for hexanoic acid. For higher values, the growth rate (μ) decreased with increasing acid concentration (P), according to the linear relationship: $\mu=\mu^*(1 - (P-P_0)/K_P)$, where μ^* is the growth rate without acid addition and K_P is the inhibition constant for the acid.

Values of K_P decreased from 0.46 M, for acetic acid, to less than 0.10 M, for hexanoic acid, which indicates that the inhibitory effect of the organic acids increases with the chain length and therefore with their hydrophobic nature. In addition, the natural logarithm of the inhibition constant and the natural logarithm of the threshold concentration were shown to be linear functions of the chain length of the acids.

It was also observed that K_P increases linearly with P_0, which seems to indicate that the same mechanism would be responsible for the growth inhibition of *Clostridium acetobutylicum* by biogenic and abiogenic organic acids.