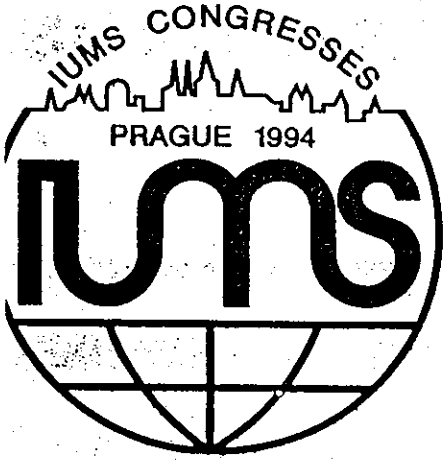

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ABSTRACT BOOK

BC–3/29

CONSUMPTION OF GLYCEROL AS CO-SUBSTRATE OF GLUCOSE IN CONTINUOUS CULTURES OF *CLOSTRIDIUM ACETOBUTYLICUM* ATCC 824. I. C. Andrade, I. Vasconcelos, Escola Superior de Biotecnologia, Universidade Católica Portuguesa, Rua Dr. António Benardino de Almeida 4200 Porto, Portugal

To maximise the synthesis of solvents in the acetone-butanol fermentation it is essential to control the carbon and energy flow patterns. This can be achieved by a choice of suitable feedstock mixtures. Using mixtures of different proportions of glucose and a more reduced chemical, like glycerol, it is possible to manipulate the overall degree of reduction of the carbon source and, therefore, to change quantitatively the metabolic flow of available reduced nucleotides.

Co-fermentation of glucose and glycerol in continuous cultures of *Clostridium acetobutylicum* ATCC 824, on a phosphate-limited synthetic medium, with a dilution rate of 0.05 h^{-1} and maintained at pH 6.5, results in the synthesis of butanol and ethanol as the major fermentation products (1). Optimal solvents yields are obtained when the molar ratio glycerol/glucose in the feed medium is 1.96. In these conditions cultures are glucose-limited, but glycerol is not entirely consumed.

To increase glycerol degradation higher amounts of glucose (the most oxidised substrate) must be co-metabolized, which allows the synthesis of reduced products, consuming the excess of NADH formed in glycerol degradation.

Experiments were performed in the same operating conditions, but without phosphate limitation and with initial molar ratios glycerol/glucose lower than 1.96. Results showed that culture stability and solvent production could be maintained in these cultures. Higher glucose levels were fermented, leading to an increase in glycerol consumption and to higher alcohol productivities.

(1) I. Vasconcelos, L. Girbal and P. Soucaille. Regulation of carbon and electron flow in *Clostridium acetobutylicum* grown in chemostat culture at neutral pH on mixtures of glucose and glycerol, J. Bacteriol. (in press).