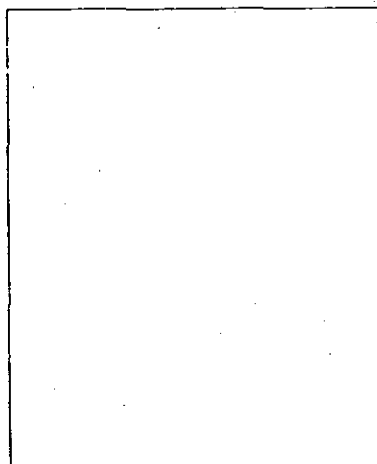
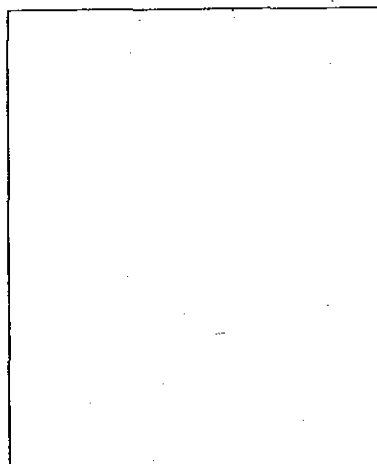
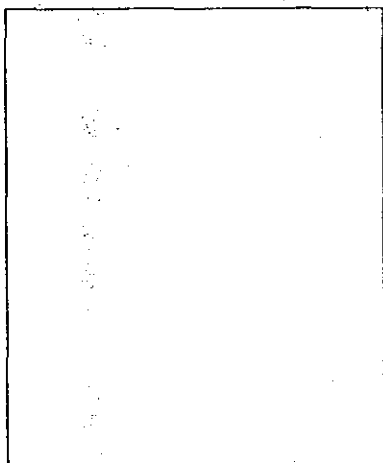


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DYNAMICS OF RECOMBINANT *E. coli* HB101[pGEc47] IN TRANSIENT EXPERIMENTS MEP 101

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E. coli HB101[pGEc47] contains a plasmid for the conversion of octane to octanoic acid. To increase its productivity it is mandatory to avoid production of metabolic overflow products. The experiments shown investigate the metabolism of this organism under different growth conditions.

Continuous culture is the method of choice because this allows us to cultivate the microorganisms under conditions varying from maintenance metabolism to almost balanced growth (maximum growth rate).

Results are plotted as X-D-diagrams (the biomass concentration X produced at a certain dilution rate D) which reveal the growth characteristics of the cultivated organism. The X-D-diagrams presented in this poster were achieved in two different ways. First, the organism was grown at a distinct dilution rate until the desired steady state was established and relevant parameters were determined. This process was repeated for every dilution rate of the X-D-diagram. Second, since the above is very time consuming, we also used dilution rate ramps, that is, the dilution rate was varied according to a preset pattern and relevant data were recorded at every appropriate dilution rate. This solution is not only faster than the first approach but also leads to a more detailed X-D-diagram.

Calculated C-balances give indirect information about the production of undesirable overflow products. The respiratory coefficient (RQ) calculation from exhaust gas measurements provides information about the metabolic behavior of the cells.

THE EFFECT OF MICROELEMENTS ON GROWTH AND ANTIBIOTIC PRODUCTION BY *STREPTOMYCES HYGROSCOPICUS* MEP 103
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Streptomyces hygroscopicus strain during fermentation produces a complex of antibiotics of the polyketide pathway. From the fermentation broth three antibiotics have been isolated: a polycene hexaene H-85*, a polyether nigericin and a macrodiolide, azalomycin B.

The effect of the composition of the fermentation medium (carbon, nitrogen source, precursors) on growth and antibiotic production has been studied. In this paper we present the effect of addition of trace metals iron and zinc, to the base medium on growth and antibiotic production. Our aim was to determine the optimal concentration of microelements for maximum antibiotic yield, especially hexaene H-85.

All fermentations were carried out in Erlenmeyer flasks on a rotary shaker (250 rev/min) at 28 °C. Concentrations of trace metals (Fe, Zn, Cu, Mn, Co and Mo) in the base medium employed were determined by atomic absorption from ashes.

Significant increase in hexaene H-85 yield was obtained with an addition of 5×10^{-4} - 5×10^{-5} mol/L of iron (as $\text{FeSO}_4 \times 7\text{H}_2\text{O}$) and somewhat less in azalomycin B. Iron, within the studied range (10^{-2} - 10^{-6} mol/L) did not affect growth of *S. hygroscopicus*. On the other hand, zinc markedly enhanced biomass production (within the range 10^{-3} - 10^{-6} mol/L of $\text{ZnSO}_4 \times 7\text{H}_2\text{O}$) whereas antibiotic production was stimulated only with a 4×10^{-5} mol/L addition, and then only hexaene H-85.

* I. Karadžić, G. Gojgić-Cvijović, J. Vučetić, J. Antibiot. 44 (1991) 1452

INFLUENCE OF IRON, PHOSPHATE AND METHYL VIIOLOGEN ON GLYCEROL FERMENTATION BY *C. BUTYRICUM* MEP 102

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For the production of 1,3-propanediol from glycerol by *C. butyricum* a defined medium was developed which gave a similar 1,3-propanediol productivity (~ 4,1 g/h) as the formerly used complex medium.

With this medium the effect of methyl viologen addition, iron and phosphate limitation on product distribution was investigated in continuous culture applying shift experiments. Special attention was paid to the gaseous products H_2 and CO_2 .

Both iron and phosphate limitation led to an increased 1,3-propanediol yield linked to a decreased H_2 release. Particularly for iron limitation a clear correlation between H_2 release and 1,3-propanediol production was found. Under phosphate limitation the H_2/CO_2 ratio dropped to 0,65 as compared to 0,86 under non limiting conditions. The 1,3-propanediol yield Y_{PDS} showed a steady, slow increase from 0,596 to 0,686, whereas the acetate yield dropped. When the iron concentration was reduced stepwise from 14 mg/l to 0,5 mg/l FeCl_3 , the H_2/CO_2 ratio decreased from 1,02 to 0,39. Simultaneously the propanediol yield increased from 0,601 to 0,686. In this case the acetate yield was not affected, but the butyrate yield decreased slightly.

Addition of 0,5 mM methyl viologen to the medium had a similar effect on product formation as phosphate limitation. Again an increase in 1,3-propanediol yield was linked to a decrease of the H_2/CO_2 ratio, and whereas the acetate yield was decreased by approximately 50%, the butyrate yield stayed nearly constant.

STABILITY OF HIGH SOLVENT PRODUCING CONTINUOUS CULTURES OF *CLOSTRIDIUM ACETOBUTYLICUM* ON MIXTURES OF GLUCOSE AND GLYCEROL. MEP 104
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To maximise the synthesis of solvents in anaerobic fermentations it is essential to control the carbon and reducing energy flow patterns. This can be achieved by a suitable choice of 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. Phosphate limitation seems to be essential to avoid strain degeneration and to maintain solvent production stability, although it slows down the organism metabolism. Optimal solvent yields are obtained when the molar ratio glycerol/ glucose in the feed medium is 1.96. In these conditions cultures are glucose limited but not carbon limited.

To increase glycerol degradation higher amounts of glucose 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 (phosphate concentration higher than 0.74 mM) and with molar ratios glycerol/ glucose lower than 1.96. Results showed that culture stability and solvent production could be maintained in these cultures. Higher glycerol consumption leads to higher butanol production, although some of the reducing energy is lost in the production of lactic and butyric acids. Conditions which allow to minimise such loss were investigated.