540 Production of nisin Z from xylose by *Lactococcus lactis* IO-1

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Lactococcus lactis IO-1 isolated in our laboratory was found to produce a peptide antibiotic which was indentified nisin Z, a natural nisin varient (1). Recently we reported the influence of several parameters on nisin Z production with glucose as the carbon source (2). IO-1 is also a highly potent strain producing L-lactate from xylose, the pentose sugar found in lignocellulosic biomass which is available in abundance as agricultural waste products.

The optimal condition for nisin Z production was studied. IO-1 cells grew at temperature 20 to 40°C of this experiment. The highest cells growth was observed at 37°C accompany with the highest nisin Z production. At xylose concentration lower than 40 g/l, the higher sugar concentration resulted in the higher nisin Z and acid production. At xylose concentration higher than 40 g/l cell growth was slow. Among the pH tested the highest nisin Z productivity derived from fermentation which controlled pH at 6.0. Addition of calcium ion promoted nisin Z production. Under the optimal condition with 0.1M $CaCl_2$ xylose provided the maximum nisin production rate of 0.26×10^4 AU/g carbon source consumed/h, and maximum activity of 1523 AU/ml whereas those from glucose fermentation were 0.58×10^4 AU/g carbon source consumed/h, and 3150 AU/ml respectively.

1) H. Matsusaki et al., Food Sci. Technol., **2**, in press (1996)
2) H. Matsusaki et al., Appl. Microbiol. Biotechnol., **45**, 36 (1996)

Key words: *Lactococcus lactis*, Nisin Z, Xylose, Bacteriocin

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D-Gulose Production from D-Sorbose by L-Rhamnose Isomerase.

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PURPOSE: As part of current research program in our laboratory concerned with the production of rare monosaccharides by microbial cells or enzymes. Mass production of D-sorbose is obtained from D-tagatose by immobilized D-tagatose 3-epimerase of *Pseudomonas cichorii* ST-24 has already been reported from our laboratory. In accordance with the present investigation, attempts should be made to produce a very expensive rare aldo-hexose, D-gulose, from D-sorbose by L-rhamnose isomerase (L-RI) extracted from mutant strain 172a.

METHODS AND RESULTS: The mutant strain 172a which had L-RI activity was isolated from soil by conventional microbiological techniques. The cells of this strain were grown on Trypto-soy broth (TSB) containing 1mM $MnCl_2$ in a desk-top jar fermentor at 30 °C. After 48 h of growth the cells were harvested by centrifugation and washed twice with deionized water. Partially purified L-RI was immobilized on chitopearl beads of BCW 2603. The transformation was carried out at 45 °C in a L-tube with shaking in a mixture contaning 5% D-sorbose, showed the yield being about 10%. After complete the reaction, immobilized enzyme with chitopearl beads were removed by filtration, washed with same buffer and deionized. The deionized content was then evaporated and concentrated under vaccum at 35 °C. After concentration, the content was applied to a column of Dowex-X (SO_4^{-2}) form and eluted with distilled water. The fractions containing D-gulose were pooled together, concentrated by evaporation and identified by HPLC. The characterization of D-gulose is now being undertaken.

Key words: D-gulose, D-sorbose, L-Rhamnose isomerase