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The application of β -D- galactosidase from *Bifidobacterium bifidum* in the synthesis of galactooligosaccharides

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Galactooligosaccharides (GOS) are a class of functional oligosaccharides considered prebiotic. GOS selectively stimulate the growth of beneficial bifidobacteria in the gut, contributing to improved gut health and overall well-being. GOS have been shown to increase probiotic viability and antioxidant activity in fermented products.

The aim of the experiments was to evaluate the preference of β -D-galactosidase from *Bifidobacterium bifidum* in the galactooligosaccharide synthesis reaction. Reactions were carried out in aqueous solutions of lactose and in the environment of deep eutectic liquids (DES). The composition of the reaction mixture was analyzed using liquid chromatography with refractometer and scattered light detector. Favorable synthesis of GOS (about 30%) was found in the reaction catalyzed by NURICA in 20-40% of lactose solutions and at 40-60°C.

At temperatures up to 30°C, the transgalactosylation reaction occurred slowly and less efficiently. During transgalactosylation reactions carried out at 70 and 80°C, the enzyme is inactivated.

In the reaction catalyzed by NURICA in a deeply eutectic liquid medium (choline chloride:glucose, 1:2 M), preferential catalysis of the hydrolysis reaction was observed.

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