

Uangkan Thathong 2013: Fructooligasaccharide Production by Immobilized Enzyme.
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Fructooligosaccharide is a type of carbohydrates, which is used as sweetener and prebiotics ingredients in food industries. Fructooligosaccharide is produced by hydrolysis and transfructosylation reaction of β -fructofuranosidase which hydrolyzed sucrose to glucose and fructose then moved fructosyl unit to bind at β -1,2 position of sucrose molecules under high concentration of sucrose. To improve fructooligosaccharide production, immobilized enzyme was used for cost reducing and reused in process. Taguchi method was applied to optimize the immobilization of β -fructofuranosidase by varying three factors at three levels. A L-9 (3^3) orthogonal array was used in the experimental design. As a result, the maximum activity of immobilized enzyme obtained was 29.71 U/ml from 3.0 % w/v sodium alginate, 150.0 U/ml of initial enzyme activity and 1.5 M calcium chloride. By statistical analysis, these factors were found to effect on immobilized enzyme activity significantly.

Repeated batch was carried out for fructooligosacchaide production with immobilized enzyme under Taguchi optimized conditions. The first cycles gave the highest concentration of fructooligosaccharide at 195.8 g/l (122.4 g/l 1-kestose, 67.7 g/l nystose, and 5.6 g/l 1^F-fructofuranosylnystose) at 4 h. The volumetric productivity, volumetric substrate uptake and yield of fructooligosaccharide were 96.69 g/l h, 135.06 g/l h and 0.72g/g at 2 h, respectively. The concentration of fructooligosaccharide decreased when increased reaction time in the other cycles. This immobilized enzyme can be used for 4 cycles in the production of fructooligosaccharide.

Student's signature

Thesis Advisor's signature