Study on the Production of Xylitol by Candida subtropicalis in Two-stage Fermentation

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ABSTRACT

Abstract Recently, it was cared by the most population that the functionality in food including the nutrient balance, the promotion in body, and so on. Xylitol, because of its taste of dew likes peppermint, low quantity of heat, the sweetening equals to the sucrose, and anti-cariogenic properties, has been appreciated gradually in the food of new generation. Otherwise, the agricultural residual production abounds with cellulose, hemicellulose, and lignin. When the hemicellulose was hydrolyzed, abundant raw materials like xylose, glucose, and few other sugars (e.g., galactose, mannose, and arabinose) was productive. Hence, the subject of several investigates on the fermentation process for productive of xylitol was discussed the liquid of the lignomicellulose hydrolyzed as the stock. Therefore, it not only reduces cost but also exploits nature resource by the sufficient disposal. In this study, in order to increase the yield and productivity of xylitol in ferment process by yeast, a two-stage fermentation that employ difference concentrations of dissolved oxygen was proposed due to the phenomenon of the diauxic growth when two kinds of main sugar (xylose and glucose) as substrate was used. Results explained that it is increased in xylitol ’ s yield and productivity when the two composite substrates were applied. According to the object of increasing the biomass yield at first-stage fermentation, the dissolved oxygen was 5~10% for glucose metabolism (μ = 0.356 hr-1). Moreover, at second-stage, metabolism of D-xylose into xylitol, the conditions of the fermentation were 0.25vvm and 130 rpm for the highest yield (0.649 g g-1) and productivity (0.263 g L-1 hr-1) of the xylitol. Based on above of results, an operation procedure that is series connection the fed-batch culture and batch culture was designed. Results of the experiment displayed that xylitol ’ s yield (0.246 g L-1 hr-1) had been increased effectively. Key world: two-stage fermentation, xylitol, dissolved oxygen, lignocellulose hydrolyzates, and diauxic growth.

Keywords : two-stage fermentation ; xylitol ; dissolved oxygen ; lignocellulose hydrolyzates ; diauxic growth

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