Sukontip Suethao 2014: Optimization of the Trehalose Production by *Propionibacterium acidipropionici* DSM 20273. Master of Science (Biotechnology), Major Field: Biotechnology, Department of Biotechnology. Thesis Advisor: Assistant Professor Pramuk Parakulsuksatid, Ph.D. 150 pages.

Trehalose is a non-reducing disaccharide, which is used widely in food, cosmetics and pharmaceutical industries. Microorganisms produce trehalose for use as a carbon source and to protect cells from stress conditions. In this study, the optimum conditions for trehalose production by *Propionibacterium acidipropionici* DSM 20273 using Taguchi method were determined by four parameters: lactose concentration, initial pH, temperature and agitation rate. The trehalose production was optimum at lactose concentration 20 g/l, initial pH 7, temperature 30˚C and agitation rate at 100 rpm. Under this condition, the highest yield of trehalose was produced at 595 mg/l at 168 h. Of the four parameters tested, the trehalose production was most affected by the temperature.

To investigate the effect of pH adjustment on trehalose production, the fermentation was performed in 3 L fermenter with complete medium under conditions: initial lactose concentration 20 g/l, initial pH 7, temperature 30˚C, agitation rate at 80 rpm and anaerobic condition. The pH was adjusted to four times: non-control of pH, control of pH 5.5 part 1, control of pH 7 and control of pH 5.5 part 2. It was found that the pH adjustment increased the accumulation of trehalose. The highest volumetric productivity and yield of trehalose were found when controlling the pH at 7, during the period of 114.30 - 192 h (0.0098 g/l/h and 0.576 g trehalose/g cell, respectively). The concentration of trehalose reached 0.925 g/l at the end of the fermentation. Furthermore, the efficiency of the lactose consumption was around 100 ± 10%.

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