

Thesis Title	Effect of Dissolved Oxygen on Bacterial Cellulose Production by <i>Acetobacter xylinum</i>
Student	Mr. Nathapol Farpinyo
Student ID	39066005
Degree	Master of Science
Programme	Food Science
Year	1999
Thesis advisor	Assoc.Prof.Dr.Warawut Krusong

### Abstract

The shaking and agitation/aeration affected the cellulose formation by *Acetobacter xylinum* DK strain. The decrease of cellulose yield was found resulting from the effect of higher amount of dissolved oxygen (DO), calls negative effect. Microaerophilic carrier such as Cellulose Porous Bead (CPB) and Cellulose Powder (CP) was used for enhancing the cellulose production in both shaken flask and fermentor.

The effect of shaking and agitation speed on cellulose production by *A. xylinum* DK strain was observed. The shaken flask and fermentor, a 100 rpm of shaking and agitation speed provided the highest amount of cellulose and cell content, were 2.14, 5.27 g dry wt/L and 0.95, 1.95 g dry wt/L, respectively, within 7 days of fermentation time at 30 °C. The 0.05% CPB was an optimum concentration for cellulose production by *A. xylinum* DK strain in both cultivation methods. The DO content was decreased while the cellulose gel was increased. There was a low DO content during high cellulose gel formation. The amount of cellulose and cell content were 2.65, 8.4 g dry wt/L and 1.48, 5.82 g dry wt/L, respectively, in shaken flask and fermentor. In case of CP, the 0.075% CP was an optimum concentration for cellulose production by *A. xylinum* DK strain. The yield of cellulose and cell content were 2.36, 8.22 g dry wt/L and 1.26, 5.27 g dry wt/L, respectively, in shaken flask and fermentor, respectively. It was noticed that both CPB and CP could provide the low DO condition which was suitable for cellulose gel formation. In continuous stirred tank reactor, cellulose and cell content obtained in both CPB and CP addition were higher than that without CPB and CP addition. In Air-lift fermentor, the effect of aeration rate on *A. xylinum* DK strain cellulose production was observed. The 0.05 vvm. of aeration rate provided the highest amount of cellulose and cell content were 0.93 g dry wt/L and 0.67 g dry

wt/L, respectively. While 0.05% CPB was an optimum concentration for cellulose production by *A. xylinum* DK strain. The decrease of DO content was observed during cellulose was produced. The similar result was found in agitated condition. The amount of cellulose produced and cell content were 2.12 g dry wt/L and 1.62 g dry wt/L, respectively. The 0.075% CP was an optimum concentration for cellulose production. The yield of cellulose and cell content were 1.82 g dry wt/L and 1.35 g dry wt/L, respectively, was obtained.