Modeling and Optimization of Fermentative Hydrogen Production by *Enterobacter aerogenes*

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Abstract

Glucose or other carbohydrates are preferred carbon source for fermentations, which give rise to acetic and butyric acids together with hydrogen. *Enterobacter aerogenes*[1] is known to evolve hydrogen at a very high rate and be one of the most competitive microorganisms for mass production of hydrogen. However, the yield of hydrogen by this bacterium is only one mol from one mol of glucose. Consequently, the improvement of the yield has been the most important challenge for utilization of this anaerobe. There are several methods to improve the yield of hydrogen: redirection of metabolic pathways, genetic improvement of microbial strain(s), maintenance of low hydrogen partial pressure with rapid gas removal and optimization of environmental factors, etc.

In this study, we focused on the effects of the initial concentration of glucose, pH and temperature on the microbial growth rate and the hydrogen yield with fractional factorial design. The response surface methodology (RSM)[2] was used to determine the optimal conditions. The 3^k factorial Box-Behnken design was employed in planning the experiments for elucidating the effects of different experimental variables.

References

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