

Supangkanang Jomsueb 2014: Production in Bioreactor and Characterization of Carboxymethylcellulase of *Thermobifida fusca* PA1-1. Master of Science (Biotechnology), Major Field: Biotechnology, Department of Biotechnology. Thesis Advisor: Associate Professor Mangkorn Rodprapakorn, Ph.D. 91 pages.

*Thermobifida fusca* PA1-1 is an actinomycetes which was isolated from palm empty bunch compost and determined as carboxymethylcellulase (CMCase) producer in high temperature condition. The objectives of this research were to optimize the CMCase production in bioreactor and to characterize CMCase of *T. fusca* PA1-1. Study on cultivation under shake flask condition was carried out in basal medium containing 1 % (w/v) CMC as sole carbon source. The result showed 50 °C was optimal temperature for growth which gave maximum CMCase activity of 0.977 unit/ml at 4<sup>th</sup> day. The effect of sugars was also investigated. The results indicated that glucose, maltose and sucrose at concentration 0.1%, 0.5% and 1% inhibited CMCase production. Furthermore, production of CMCase in 2 liter bioreactor was carried out at 1 vvm aeration rate and at 200 rpm agitation speed. In comparison with optimized condition in shake flask, the observed value of maximum CMCase production was 2.027 units/ml which was a 2.07-fold increase and production time was shortened to only 60 h. Characterization of crude CMCase exhibited optimal activity at pH 4.0 and 60 °C. Stability was highest in the range of pH 5.0 – 11.0 and 30 - 70 °C. The activity of CMCase was significantly activated by K<sup>+</sup> and Mn<sup>2+</sup> and inhibited by Ca<sup>2+</sup>, Fe<sup>2+</sup>, Mg<sup>2+</sup> and EDTA. Moreover, CMCase from *T. fusca* PA1-1 can be degraded cellulose substrate such as CM and avicel and hemicellulase substrate such as xylan.

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