

Optimization of culture conditions for functional expression of chCODH using recombinant E. coli in batch fermentation

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Formic acid is mainly used as a preservative in livestock feed and a coagulant in rubber production processes. In a two stage biocatalytic CO conversion system, CODH is a key enzyme in oxidation of CO to CO₂. In this study, we tried to increase the functional chCODH by optimizing the culture conditions of genetically engineered E. coli that produce CODH in a 5L-scale fermenter. The chCODH was originated from anaerobic microorganism Carboxydotherrmus hydrogenoformans. First, culture medium was compared to find optimal CODH expression conditions. Second, in the LB medium, the concentration of IPTG was optimized that effectively expresses the CODH enzyme without inhibiting the growth of bacteria. In addition, it was explored that the condition for inducing the highest enzyme activity by varying the timing of adding IPTG during cell culture. IPTG was added when the OD_{600nm} value reached 3, 5, 8, and 10, respectively, and the enzyme activity was measured in each sample. As a result, the highest enzyme activity was shown in which IPTG was added at OD_{600nm} 5. It is expected that further increase of functional CODH production by optimizing the media composition and the culture conditions.