

Immobilization of Bacterial Cells for Hydrogen Production from Formic Acid

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The storage of hydrogen is one of the most critical problems that we are currently facing. Formic acid can be used to solve this problem. *Enterobacter asburiae* SNU-1, can generate hydrogen from formic acid using formate hydrogen lyase (FHL). In the previous studies, this bio-reforming system showed many advantages over catalytic reforming of formic acid. However, the stability of hydrogen production was low and the process of cell preparation was complex. Hence, in order to resolve this, the bacterial cells were immobilized with calcium-alginate bead. Immobilized cells were more tolerant of low pH and high oxygen concentration than free cells, but the optimum condition was the same as free cells (37°C, pH 6.1). At the optimum condition, immobilized cells produced less hydrogen at the early stage of the reaction possibly due to low mass transfer. But in the long run it showed higher productivity, which means that the stability of hydrogen production was improved. As a result, immobilized cells produced more hydrogen than free cells. Moreover immobilization made the hydrogen production process more simple and efficient. The reuse of cultured immobilized cells made the recovery of hydrogen production.