

Thesis Title	Synthesis of Prednisolone by Using Immobilized Microbial Cell in Two-Liquid-Phase System	
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#### Abstract

The synthesis of prednisolone by using immobilized microbial cells in two-liquid phase system was studied. Three bacterial strains used were *Bacillus sphaericus* ATCC 13805, *Bacillus sphaericus* SRP III and *Arthrobacter simplex* ATCC 6946. The free cells, immobilized cells and the reusing of immobilized cells in aqueous and two-liquid-phase systems, the increasing hydrocortisone concentration in two liquid phase system were compared in the prednisolone synthesis. The changing of cell numbers in both systems was also studied. In aqueous phase, the initial amount of cells for immobilization had an effect on prednisolone synthesis, the immobilized cells of *B. sphaericus* ATCC 13805 and *B. sphaericus* SRP III being able to produce prednisolone with the yields of 91.90 and 80.10% respectively which were about 5-15% higher than free form except *A. simplex* ATCC 6946. In two-liquid-phase system, the efficiency of immobilized and free cells were not different. Prednisolone synthesis depended on types of organic solvent. n-Decane was the most suitable organic solvent for immobilized cells of *B. sphaericus*.

ATCC 13805 and free *A. simplex* ATCC 6946 which gave the maximum prednisolone synthesis with the yields of 81.80 and 84.40% at 48 and 6 hours, respectively. For butyl acetate, immobilized cells of *B. sphaericus* ATCC 13805, *B. sphaericus* SRP III and *A. simplex* ATCC 6946 could produce prednisolone with maximum yields of 81.60, 70.60 and 83.30% with long optimal incubation time of 144, 120 and 144 hours, respectively. For cyclohexane or alcohols such as amyl alcohol, lauryl alcohol and n-decyl alcohol, the product formation is rather low (0.30%). The production of prednisolone decreased about 3-20% when reusing the immobilized cells. Increasing of substrate concentration: hydrocortisone, or n-decane ratio gave 2 times lower prednisolone synthesis and hydrocortisone remained. The change of bacterial amount in aqueous phase was completely different from two-liquid-phase system. The immobilization, using calcium alginate as carrier, could not prevent the leakage, hence the active cells were both in immobilized and free forms. In comparison of three types of immobilized bacterial cell, the efficiency of *B. sphaericus* ATCC 13805 and *B. sphaericus* SRP III for the prednisolone synthesis in aqueous phase was 5-30% higher than two-liquid-phase system; whereas *B. sphaericus* SRP III gave lower activity. The results of this study can be further applied in the production of pharmaceutical raw materials and other products.