

IMMOBILIZATION OF GLUCOAMYLASE BY REVERSIBLE SOLUBLE-INSOLUBLE CARRIERS

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ABSTRACT

A REVERSIBLE SOLUBLE-INSOLUBLE GLUCOAMYLASE WAS PREPARED BY COVALENTLY IMMOBILIZING ON AN ENTERIC COATING POLYMER WITH SOME ACTIVATION REAGENTS. TO BE REUSED, THE IMMOBILIZED GLUCOAMYLASE WAS DESIGNED TO REACT IN SOLUBLE SOLUTION, AND TO BE SEPARATED IN INSOLUBLE FORM AFTER REACTION BY CHANGE THE PH VALUE OF SOLUTION. THIS STUDY WAS DIVIDED INTO TWO PARTS. AT THE FIRST PART, SOME PH DEPENDENT TYPES OF REPRESENTATIVE REVERSIBLE SOLUBLE-INSOLUBLE POLYMERS LIKE AS-L, HP-50 AND CAP WAS USED, AND THE GLUCOAMYLASE WAS IMMOBILIZED WITH SOME ACTIVATION REAGENTS, LIKE GLUTARALDEHYDE, EDC AND CYANURIC CHLORIDE TO BECOME REVERSIBLE SOLUBLE-INSOLUBLE IMMOBILIZED GLUCOAMYLASE. THE POLYMER CARRIERS WERE SCREENED BASE ON THE ENZYME ACTIVITY AND PROTEIN QUANTITY. AT THE SECOND PART OF THIS STUDY, THE CHANGES OF PRIMARY PROPERTIES, OPERATE STABILITY, THERMAL STABILITY AND KINETICS PROPERTIES BETWEEN IMMOBILIZED AND FREE GLUCOAMYLASE WERE DETERMINED BASE ON THE OPTIMAL OPERATION CONDITION. THE RESULT OF THIS STUDY WAS SHOWED THAT THE ENZYME WITH CAP AS CARRIER HAS THE BEST ACTIVITY AND THE LARGEST IMMOBILIZED PROTEIN QUANTITY WHEN THE CONCENTRATION OF CAP WAS 32 MG/ML THE BEGGEST PROTEIN IMMOBILIZED QUANTITY WAS APPROXIMATELY 5 MG/ML, THE ACTIVITY IMMOBILIZED WAS APPROXIMATELY 173 U/ML. THE OPTIMUM HYDROLYSIS TEMPERATURE OF FREE AND IMMOBILIZED GLUCOAMYLASES WERE 50 AND 55 RESPECTIVELY. THE OPTIMUM HYDROLYSIS PH OF FREE AND IMMOBILIZED GLUCOAMYLASE WERE RESPECTIVELY SITUATED BETWEEN 6.0 AND 7.0 AND 7.0 AND 8.0 RESPECTIVELY. THE THERMAL STABILITY WAS IMPROVED BY THE IMMOBILIZATION PROCESS. ACCORDING TO THE VARIETIES OF KM AND VMAX OF FREE AND IMMOBILIZED GLUCOAMYLASE, THE GLUCOAMYLASE WAS NO OBVIOUSLY EFFECTED IN MASS TRANSFER BETWEEN THE REVERSIBLE SOLUBLE-INSOLUBLE CARRIER. AT LEAST, THE SIMILAR ACTIVATION ENERGY BETWEEN FREE AND IMMOBILIZED GLUCOAMYLASE EVEN AT DIFFERENT STARCH CONCENTRATION. IT SHOWED THAT THE REACTION OF IMMOBILIZED GLUCOAMYLASE WASN'T AFFECTED BY MASS DIFUSSION.

Keywords : REVERSIBLE, SOLUBLE-INSOLUBLE, GLUCOAMYLASE, IMMOBILIZATION.

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