IMMOBILIZATION OF GLUCOAMYLASE FOR THE HYDROLYSIS OF STARCH AND DEXTRINIZED STARCH

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The isoelectric pH of glucoamylase from *Aspergillus niger* was between 3.5 and 4.0. In the studies for the selection of carrier for immobilization of glucoamylase, cation exchanger Amberlite IR-120 and anion exchanger Amberlite IRA-904 were used. For Amberlite IR-120, immobilization yields of protein and glucoamylase units were 10 and 11% respectively at pH 3.3 and at pH 2.5 were 14 6 and 15.1% respectively. Retentivities of Amberlite IR-120 for glucoamylase activity at 55°C and at pH 3.3 and 2.5 after 5 successive batch reactions (each 10 min duration) were 1.6 (+/ − 0.47) and 2.7 (+/ − 0.47) respectively. Cation exchanger Amberlite IR-120 was not suitable for immobilization of this enzyme as it showed poor retaining capacity. Hence the experiments were carried out with anion exchanger Amberlite IRA-904. The capacity was 42mg protein (493 AMG units) per gram (wet Wt) of resin at pH 4.5, giving an immobilization yield of 64% protein and 67.5% AMG units. The activity yield (a measure of functional fraction of expected immbolized enzyme activity) was 2.2% which indicates poor expression of immobilized glucoamylase activity. The retentivity of the enzyme activity was 94.4% (+/ − 2.3). Relative activities of soluble glucoamylase with 2% (W/V) starch, dextrinized starch (DE 36) and maltose were 100, 52.2 and 37.5% respectively. The activity yields of Amberlite IRA-904 immobilized glucoamylase were 22.3 and 28.0% with dextrinized starch and maltose respectively. Effectiveness factor, which is a measure of diffusional restriction for substrate molecule was 7.3, 1.6 and 1.1 for starch, dextrinized starch and maltose respectively. Thus glucoamylase is suitable for the physical immobilization on Amberlite IRA-904 and for continuous saccharification. It is desirable to use dextrinized starch than soluble starch and maltose with the immobilized glucoamylase.