

COMBINATION OF IMMOBILIZATION TECHNIQUES OF XYLANASE BY ENTRAPMENT AND COVALENT BINDING ON ALGINATE HYDROGEL BEADS

(Kombinasi Teknik Pemerangkapan dan Ikatan Kovalen untuk Imobilisasi *Xylanase* Menggunakan Manik Hidrogel Alginat)

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Abstract

Enzymes serving as biocatalysts and play an important roles in many industrial field. However, the limitation of enzyme usage due to its high cost and unstable conditions of soluble enzyme to harsh conditions lead to findings an alternative to enhance the enzyme efficiency by immobilization (insoluble enzyme). The present work reported a combination of immobilization technique of xylanase by entrapment and covalent binding on alginate hydrogel beads. Xylanase enzyme was effectively immobilized within the alginate hydrogel beads by entrapment and covalent binding on the surface of alginate beads using glutaraldehyde as a cross-linked agent. The effects of immobilization parameters include of sodium alginate concentration (% w/v), calcium chloride (M), and glutaraldehyde concentration (% w/v) were studied in order to obtain a better immobilization yield. These effects were studied using one-factor-at-one-time (OFAT) to obtain the best conditions for xylanase immobilization. The analysis of xylanase activity was determined using dinitrosalicylic (DNS) acid reagent method. Maximal enzyme immobilization yield (>80 %) was achieved at 3.0 % w/v sodium alginate concentration, 0.3 M calcium alginate, and 9 % w/v of glutaraldehyde concentration. The study shows the xylanase can be immobilized efficiently by a combination of immobilization techniques by entrapment and covalent binding on alginate hydrogel beads.

Keywords: Xylanase; Immobilization; Entrapment; Covalent binding

Abstrak

Enzim bertindak sebagai pemangkin biologi dan memainkan peranan penting dalam banyak bidang perindustrian. Walau bagaimanapun, penggunaan enzim terhad di sebabkan oleh kos yang tinggi and faktor ketidakstabilan enzyme larut kepada keadaan yang teruk. Kajian sekarang dilaporkan mengenai penggabungan teknik imobilisasi *xylanase* melalui teknik pemerangkapan dan ikatan kovalen di atas permukaan manik hidrogel alginat menggunakan glutaraldehid sebagai agen rangkai silang. Kesan-kesan parameter imobilisasi iaitu terdiri daripada kepekatan natrium