

Cross-Linked Amyloglucosidase Aggregates: A New Carrier Free Immobilization Strategy for Continuous Saccharification of Starch

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Abstract : The importance of attaining an optimum performance of an enzyme is often a question of devising an effective method for its immobilization. Cross-linked enzyme aggregate (CLEAs) is a new approach for immobilization of enzymes using carrier free strategy. This method is exquisitely simple (involving precipitation of the enzyme from aqueous buffer followed by cross-linking of the resulting physical aggregates of enzyme molecules) and amenable to rapid optimization. Among many industrial enzymes, amyloglucosidase is an important amylolytic enzyme that hydrolyzes alpha (1→4) and alpha (1→6) glycosidic bonds in starch molecule and produce glucose as a sole end product. Glucose liberated by amyloglucosidase can be used for the production of ethanol and glucose syrups. Besides this amyloglucosidase can be widely used in various food and pharmaceuticals industries. For production of amyloglucosidase on commercial scale, filamentous fungi of genera *Aspergillus* are mostly used because they secrete large amount of enzymes extracellularly. The current investigation was based on isolation and identification of filamentous fungi from genus *Aspergillus* for the production of amyloglucosidase in submerged fermentation and optimization of cultivation parameters for starch saccharification. Natural isolates were identified as *Aspergillus niger* KIBGE-IB36, *Aspergillus fumigatus* KIBGE-IB33, *Aspergillus flavus* KIBGE-IB34 and *Aspergillus terreus* KIBGE-IB35 on taxonomical basis and 18S rDNA analysis and their sequence were submitted to GenBank. Among them, *Aspergillus fumigatus* KIBGE-IB33 was selected on the basis of maximum enzyme production. After optimization of fermentation conditions enzyme was immobilized on CLEA. Different parameters were optimized for maximum immobilization of amyloglucosidase. Data of enzyme stability (thermal and Storage) and reusability suggested the applicability of immobilized amyloglucosidase for continuous saccharification of starch in industrial processes.

Keywords : aspergillus, immobilization, industrial processes, starch saccharification

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