Effect of Crosslinkers on Immobilization of ß-Galactosidase on Polymethacrylate Monolith.

ABSTRACT

Advances in biotechnology unfold a new frontier for the development of enzyme-catalysed bioprocess which is green and sustainable in contrast with chemical processes. Immobilization technology appears as a beneficial solution to the uneconomical cost of enzyme operation. Immobilization of enzyme via crosslinking approach has become a technology interest due to the more concentrate enzyme activity in the catalyst compared to other techniques. In this study, two types of crosslinker, glutaraldehyde and hexamethylene diisocyanate at different concentration was investigated in immobilizing β-galactosidase on polymethacrylate monolith. The enzyme activity upon immobilization was measured spectrophotometrically at 405 nm. The immobilized enzyme was further characterized using Fourier Transform Infrared Spesctroscopy (FTIR) and Zeiss Axio Fluorescence Microscope. The findings showed that the optimum enzyme activity was achieved when using 0.05% and 0.01% glutaraldehyde hexamethylene diisocyanate respectively. Beyond that concentration, a significant reduction of enzyme activity was observed. It was found that glutaraldehyde was preferable as crosslinking agent as hexamethylene diisocyanate exhibited stronger effect in reducing enzyme activity. A successful binding of β-galactosidase on polymethacrylate monolith was observed using Fourier-transform infrared spectroscopy (FTIR) and Zeiss Axio Fluorescence microscope. The outcomes of this study indicate the potential of enzyme immobilization on monolith via crosslinking method.