KINETICS OF b-GALACTOSIDASE IMMOBILIZED ON POLYSILOXANE-POLYVINYL ALCOHOL MAGNETIC COMPOSITE – POS-PVA$_M$

Neri, D.F.M.[1,2], Balcão, V.M.[2], Carneiro-da-Cunha, M.G.[1], Carvalho-Jr, L.B.[1], Teixeira, J.A.C.[2]

Departamento de Bioquímica and Laboratório de Imunopatologia Keizo Asami, Universidade Federal de Pernambuco, Brazil[1], IBB-Institute for Biotechnology and Bioengineering, Centre for Biological Engineering, Universidade do Minho, Campus de Gualtar 4710-057, Braga, Portugal[2]

β-Galactosidase is an enzyme with a wide industrial application, mostly in the hydrolysis of lactose and, more recently, in the synthesis of oligosaccharides. Several advantages are associated with the application of immobilized enzymes. In this work, β-Galactosidase was covalently immobilized onto a POS-PVA$_M$ using glutaraldehyde as activating agent and its hydrolytic properties evaluated. For both soluble and immobilized β-Galactosidase, the optimal temperature and pH were found to be 50 ºC and 6.5, respectively. The immobilized enzyme showed to be more resistant than the soluble form when hydrolysis experiments were performed out within the above optimal condition, being the observed difference in activity more pronounced for temperatures higher than 50ºC. An enhancement of the thermal stability of the immobilized enzyme was also observed. The apparent K_m and Ea for both soluble (7.377 ± 1.303mM and 25.51 ± 8.72Kj mol^{-1}) and immobilized enzyme (7.841 ± 1.189mM and 32.61 ± 5.82Kj mol^{-1}) showed to be not significantly different. The immobilization also proved to be advantageous as, after twenty reutilizations, the immobilized enzyme retained about 52% of its initial activity. These results clearly demonstrate that POS-PVA$_M$ may be used for β-Galactosidase immobilization since, besides improving the enzyme hydrolytic properties, its separation from the obtained reaction products is easier to accomplish.