Enhancement in stability of yeast alcohol dehydrogenase by covalent immobilization on modified polyvinyl alcohol fiber solid support

Abstract

Immobilization of yeast alcohol dehydrogenase from Saccharomyces cerevisiae on polyvinyl alcohol fiber based solid state support has been investigated with regards to increase in stability at different pH, enzyme storage stability, and reusability. ADH immobilized on matrix maintained 60% of its original activity after 3 times of repeated use. The activity profile as function of pH, temperature, and storage stability was measured between the free and immobilized enzyme. The immobilization of ADH on the support caused the optimal reaction pH shift from 7 to 9. Immobilization showed improvement in thermal inactivation and 10 % less loss of activity upon storage in PBS at 4°C when compared with free ADH. Herein we proposed covalent attachment of ADH enzyme to PVA fibrous solid support. The strategy for bioconjugation involved functionalization fibrous solid support with chloropropinoyl chloride followed by amination with ethylene diamine which act as spacer. These aminated fibrous support crosslinked with glutaraldehyde to create aldehyde functionality on PVA fibrous scaffold which can form covalent linkage by Schiff base reaction with amino groups of enzyme. The effect of various spacer length diamine were studied with hexamethylene diamine, 1, 12 dodecamine, polyimine (PEI) and jeffamine to analyze change in activity profile