INCREASING PECTINASE ENZYME ACTIVITY BY INCORPORATING A SURFACE ACTIVE MICROGEL

Almudhhi I.Y.[1], Kuzmin V.I.[1], Mironov M.A.[1]
[1)] Ural Federal University named after the First President of Russia B.N. Yeltsin, Ekaterinburg, Russia
E-mail: uktr017@gmail.com

microgels were made to be a carrier for enzymes. the microgels with enzymes proved to increase enzymatic activity due to the surface activity nature of the microgels that helps concentrated the enzyme on the surface of solid particles suspended in solution.

The work is devoted to the production of a microgel based on a biopolymer with the inclusion of an enzyme (pectinase) and the study of increasing enzymatic activity on the example of decomposition of pectin (insoluble protopectin) pulp. Microgels based on biopolymers are clusters of particles crosslinked to each other physically or chemically. Due to non-toxicity, customizable sizes, and an internal system capable of incorporating medicinal substances, microgels can be effectively used in medicine.1 They can also catalyze interfacial reactions due to tunable surface activity.

The goal of this work was to develop cross-linked microgel based on carboxymethylated cellulose and polyvinylamine and to include the enzyme pectinase on its surface. We have optimized the process of obtaining microgel, selected the ratio of reagents at which particles with a size range from 450 to 600 nm are formed (Dimensions were confirmed by DLS). Also, the results of atomic force microscopy provide information about the structure of microgel particles. Pectinase was physically attached to the surface of the microgel in order to increase its enzymatic activity.

As test systems, we prepared two glasses with pectin pulp in water. We added pectinase to the first glass, and a microgel containing the same amount of pectinase to the second. By recording the amount of sugars formed, soluble pectin after the breaking the glycosidic bonds due to the degradation of protopectin and furthermore the degradation of side sugars such as D-galactose and D-Arabinose by sulfuric acid2,3, after equal time in the systems, we came to the conclusion that the microgel increases the activity of the enzyme by directing it to the phase boundary increasing its effectiveness up to 3-folds where 0.25 ml of enzyme in microgels was equal in effectiveness to 1 ml of enzyme. The pectinase we used was checked to determine its enzymatic activity. It has an enzymatic activity equal to 70 units/gram, therefore our final microgel with the attached enzyme has 280 units/gram activity.

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