PS – R36

6. Bioprocesses and biocatalysis

Xylanase production by solid-state fermentation and study of separation with flexible polymers chains

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Xylanase is a key biocatalyst for several modern bioprocesses. It is required in large amounts and regularly it requires to be induced with xylan. Corn cob can be considered as an important source of xylan, for this reason the use of such agroindustrial residue can be an attractive alternative if it is used as support and nutrient source for fungal growth and xylanase production. One important aspect in the production of enzymes with industrial interest, refers to the process of recovery. Although the accumulation of extracellular enzymes during the solid-state fermentation facilitates their recovery, most of the methodologies used for time-consuming purification plus they are expensive and low yields. Aqueous two-phase systems (ATPS) are an attractive bioseparative technique for purification and ideal for the recovery of enzymes and other biomolecules due to the low interfacial tension and high water content, which provides a favorable environment for the preservation of the biological activity of labile molecules. In this study, it was possible to produce xylanase, allow us to obtain enzymatic activities at 2300 U L^{-1} and these results show us the ability of the microorganism to degrade and invade the substrate for growth. Enzyme was efficiently concentrated by ATPS.

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PS – R37

6. Bioprocesses and biocatalysis

Cellulase production by solid state fermentation and its separation with polyacrylate

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Aspergillus niger GH1 is reported in the literature as an important producer of extracellular enzymes in Solid State Fermentation (SSF) in many organic substrates with good yields. Mexico in 2014, 25,500,000 tons of corn waste were produced. For that reason, in this work the corn cob was considered as an excellent support for SSF. Through this fermentation system, a multi-enzymatic extract was produced, with high activity after 96 hours of fermentation. One of the enzyme activities was expressed as cellulolytic activity. For the recovery of the enzymes, the process performed in one step of precipitation of enzymes with a negatively charged (polyacrylate PAA 240,000) polymer, applied directly to an extract of *A. niger* GH1. This allowed an acceptable recovery of the enzymes and a high purification factor in the precipitate with endo and exoglucanase activities. The optimum conditions of precipitation of the enzymes with PAA were as follows: 400 ml of PAA (0.05%, w/w) pH 3.00, 2 ml of phosphate buffer, pH 3.00, and 2.4 ml of enzyme extract pH 3.00. The highest results of recovery performance were obtained for exoglucanase activity.

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PS – R38

6. Bioprocesses and biocatalysis

Immobilization of lipases from *Rhizomucor miehei* in β-cyclodextrin polymers: pretreatment with olive oil and operational stability in esterification reactions

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Microbial lipases are currently receiving great attention because of their diversity in catalytic activity, high yield and low cost production. Moreover, microbial lipases are also stable in organic solvents and possess broad substrate specificity. For commercial exploitation of a specific microbial lipase, it is essential to achieve high yield, high activity and high stability. The aim of this work was to study the influence of the pretreatment with olive oil on *Rhizomucor miehei* lipase activity and operational stability after immobilization in crosslinked β-cyclodextrin polymers. With this treatment the active site of lipase is masked in order to prevent covalent bond formation near the active site during immobilization. The results showed that the activity of the immobilized enzyme increased by more than 1.4 times. The immobilized lipase activities were maintained at levels exceeding 50% of their original activities after 30 reuses. Additionally, the immobilized enzyme remained active in a 60% after six months of storage at 4°C.

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