LIPASE IMMOBILIZED IN VERMICULITE

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ABSTRACT

Enzyme immobilization aims at the reuse of the enzyme in multiple reaction cycles, reducing the need for continuous production of new enzymes. The ideal support should be economical and have adequate surface area. Vermiculite is a promising and innovative support, as it is an accessible, nationally extracted, inert, porous and little explored mineral for this purpose. In this study, *Candida antartica* lipase B (CALB) was immobilized by adsorption on vermiculite and its recovery and reuse were evaluated. Commercial vermiculite was treated with 30% hydrogen peroxide solution for 15 minutes under magnetic stirring, followed by three washes with distilled water. It was then exposed to a saturated solution of EDTA for one hour (under magnetic agitation), filtered, dried in an oven at 105° for 24 hours and crushed until it reached a mesh size of 32-42. For immobilization, the CALB solution was added to vermiculite in a 1:1 ratio and kept at room temperature for one hour. The enzymatic esterification activity (ESA, U/g) was evaluated in the synthesis of ethyl oleate, using 0.2g of immobilized catalyzer or 1mL of free enzyme in 5g of reaction medium (molar oleic acid:ethyl alcohol ratio of 1:1). The ESA of the free enzyme was 55 U/g, while the immobilized catalyst reached 106.6 U/g, representing a significant improvement in the activity in relation to the free enzyme. The increased activity is due to the reduction of the steric barrier and greater enzymatic flexibility, which facilitates the access of the substrate to the active site. The reuse of the immobilized catalyst maintained 100% of the initial activity in the second cycle of use, but dropped to 36% in the third cycle, a behavior related to leaching of the enzyme from the support. Although vermiculite is promising, new studies using crosslinkers to fix the enzyme to the support can be carried out, seeking to increase the number of operating cycles.

Keywords: Antarctic candida, Enzymatic reuse, Mineral support.

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