Immobilization of an antarctic pseudomonas AMS8 lipase lor low temperature ethyl hexanoate synthesis.

ABSTRACT

The demand for synthetic flavor ester is high, especially in the food, beverage, and cosmetic and pharmaceutical industries. It is derived from the reaction between a short-chain fatty acid and alcohol. Lipases from Antarctic bacteria have gained huge interest in the industry due to its ability react at low temperatures. The use of immobilization enzymes is one of the methods that can improve the stability of the enzyme. The current work encompasses the low temperature enzymatic synthesis of ethyl hexanoate by direct esterification of ethanol with hexanoic acid in a toluene and solvent-free system. The effects of various reaction parameters such as the organic solvent, temperature, time, substrate, substrate ratio and concentration, enzyme concentration on ethyl hexanoate synthesis were tested. Several matrices were used for immobilization and comparisons of the efficiency of immobilized enzyme with free enzyme in the synthesis of flavor ester were conducted. Ester production was optimally synthesized at 20°C in both systems—immobilized and free enzyme. A 69% ester conversion rate was achieved after a two-hour incubation in toluene, compared to 47% in a solvent-free system for free enzyme. Immobilized AMS8 lipase showed a higher conversion of ester in toluene with respect to free-solvents, from 80% to 59%, respectively. Immobilized enzymes showed enhancement to the stability of the enzyme in the presence of the organic solvent. The development of AMS8 lipase as an immobilized biocatalyst demonstrates great potential as a cost-effective enzyme for biocatalysis and biotransformation in the food industry.

Keyword : Cold adapted lipase; Immobilization; Esterification