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Lipase B from Candida antarctica in AOT-Water-Isooctane reverse micellar systems under high salt conditions to enhance butyl oleate synthesis.

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PURPOSE OF THE ABSTRACT

Reverse micelles act as a biocompatible shield to host biocatalysts in an aqueous medium against the aggressive organic solvent, where this nanoreactor delimits an inner water core and an outer organic solvent (Bhavya, Priyanka, & Rastogi, 2012; Mohd-Setapar, Mohamad-aziz, Harun, & Mohd-azizi, 2012; Pileni, 1993). Therefore, reverse micelles are particularly favorable systems for lipases, due to the enhanced selective solubility of the substrates by the intimate liquid-liquid contact they maintain with the organic solvent and the polar characteristics of the core that provide a physiological environment for lipases (Mohd-Setapar et al., 2012). In the present investigation, the synthesis of butyl oleate by Candida antarctica lipase B (CalB) under extreme halophilic conditions was investigated using the AOT/ Water/ Isooctane reverse micellar system. The impact of aqueous content (Wo=[H2O]/([Surfactant])) and NaCl variation on the enzymatic activity of CalB in the reaction of butyl oleate in reverse micelles was explored. The results indicated that, as a function of increasing NaCl, it is remarkable to achieve higher enzymatic activity parameters, such as 444.85 µmol/min at 5 M NaCl and Wo = 10, as the best esterification conditions at pH 7.2 and 30 °C. However, it was clear that the synthesis of butyl oleate by CalB lipase increased as a function of the reduction of the average reverse micelle size, where the reverse micelle sizes were determined by dynamic light scattering (DLS) and it was observed that the behavior of the reverse micelle size can be described as a function of water content and salt ion fluctuation. Consequently, the increase in butyl oleate synthesis demonstrated the potential of reverse micelles as systems that enhance mass transport phenomena in heterogeneous biocatalysis. Furthermore, reverse micelles are promising systems for the investigation of extreme halophilic lipases.

FIGURES

FIGURE 1

FIGURE 2

KEYWORDS

Reverse micelle | AOT | lipase-catalyzed esterification | halophilic enzymes

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