Extractive fermentation for improved production and recovery of lipase derived from *Burkholderia cepacia* using a thermoseparating polymer in aqueous two-phase systems

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1. Introduction

An aqueous two-phase system (ATPS) has been proposed as an ideal purification technique for the separation, extraction and concentration of biomolecules because of the system's high productivity, simplicity, short processing time, cost effectiveness, scalability and versatility. The ATPS method has been applied in downstream processing for compounds like enzymes (Ashipala and He, 2008; Alred et al., 1992). With the addition of EOPO to the fermentation, an aqueous two-phase system for simultaneous cell cultivation and downstream processing of extracellular *Burkholderia cepacia* lipase. A 10% (w/w) solution of ethylene oxide–propylene oxide (EOPO) with a molecular mass of 3900 g/mol and pH 8.5, a 200 rpm speed, and 30 °C were selected as the optimal conditions for lipase production (55 U/ml). Repetitive batch fermentation was performed by continuous replacement of the top phase every 24 h, which resulted in an average cell growth mass of 4.7 g/L for 10 extractive batches over 240 h. In scaling-up the process, a bench-scale bioreactor was tested under the conditions that had been optimized in flasks. The production rate and recovery yield were higher in the bioreactor compared to fermentation performed in flasks.

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