

Production of γ -cyclodextrin by *Bacillus cereus* cyclodextrin glycosyltransferase using extractive bioconversion in polymer-salt aqueous two-phase system

ABSTRACT

Aqueous two-phase system (ATPS) extractive bioconversion provides a technique which integrates bioconversion and purification into a single step process. Extractive bioconversion of gamma-cyclodextrin (γ -CD) from soluble starch with cyclodextrin glycosyltransferase (CGTase, EC 2.4.1.19) enzyme derived from *Bacillus cereus* was evaluated using polyethylene glycol (PEG)/potassium phosphate based on ATPS. The optimum condition was attained in the ATPS constituted of 30.0% (w/w) PEG 3000 g/mol and 7.0% (w/w) potassium phosphate. A γ -CD concentration of 1.60 mg/mL with a 19% concentration ratio was recovered after 1 h bioconversion process. The γ -CD was mainly partitioned to the top phase ($Y_T = 81.88\%$), with CGTase partitioning in the salt-rich bottom phase ($K_{CGTase} = 0.51$). Repetitive batch processes of extractive bioconversion were successfully recycled three times, indicating that this is an environmental friendly and a cost saving technique for γ -CD production and purification.

Keyword: Aqueous two-phase system; *Bacillus cereus*; Cyclodextrin; Cyclodextrin glycosyltransferase; Extractive bioconversion