Extractive bioconversion of gamma-cyclodextrin and recycling of cyclodextrin glycosyltransferase in liquid biphasic system using thermo-separating polymer

ABSTRACT

An extractive bioconversion conducted on soluble starch with cyclodextrin glycosyltransferase (CGTase) enzyme in ethylene oxide-propylene oxide (EOPO)/potassium phosphates liquid biphasic system (LBS) to extract gamma-cyclodextrin (γ-CD) was examined. A range of EOPO (with potassium phosphates) molecular weights was screen to investigate the effect of the latter on the portioning efficiency of CGTase and γ-CD. The results show that the optimal top phase γ-CD yield (74.4%) was reached in 35.0% (w/w) EOPO 970 and 10.0% (w/w) potassium phosphate with 2.0% (w/w) sodium chloride. A theoretical explanation for the effect of NaCl on γ-CD was also presented. After a 2 h bioconversion process, a total of 0.87 mg/mL concentration of γ-CD was produced in the EOPO/ phosphates LBS top phase. After the extraction of top phase from LBS, four continuous repetitive batches were successfully conducted with relative CGTase activity of 1.00, 0.86, 0.45, and 0.40 respectively.

Keyword: Liquid biphasic system; Ethylene oxide-propylene oxide; Extractive bioconversion; Cyclodextrin; Bacillus cereus