

Physical characterisations of a single-stage Kühni-type aqueous two-phase extraction column

ABSTRACT

The main parameters which influence the behaviour of phase separation in a single-stage Kühni-type aqueous two-phase extraction column containing polyethylene (PEG) and di-potassium hydrogen phosphate were characterised. Two aqueous two-phase system (ATPS) composed of 12% (w/w) PEG 1450 and 12% (w/w) di-potassium hydrogen phosphate (designated as 12/12) and 12% (w/w) PEG 1450 and 11% (w/w) di-potassium hydrogen phosphate (designated as 12/11) were chosen in this study. The hold-up D increased with increasing impeller speeds and mobile phase flow rates. Phase separation for the 12/11 system was slower than that for the 12/12 system, which resulted in higher dispersed phase hold-up values for the 12/11 system. For 12/12 system, mass transfer of plasmid DNA (pDNA) from the dispersed mobile phase to the stationary phase increased rapidly with increasing impeller speeds of 130, 160 and 200 rpm which was reflected in the decreased values for CT/CT_0 . The degree of back-mixing quantified by the axial dispersion coefficient D_{ax} was estimated to be $2.7 \times 10^{-6} \text{ m}^2 \text{ s}^{-1}$.

Keyword: Bioseparations, Aqueous two-phase system, Extraction, Precipitation, Physical