

Selective partition of plasmid DNA and RNA in aqueous two-phase systems by the addition of neutral salt.

ABSTRACT

The selective partition of plasmid DNA (pDNA) and RNA in polyethylene glycol (PEG) and di-potassium hydrogen phosphate aqueous two-phase systems (ATPSs) by addition of NaCl salt was studied with pure pDNA and RNA solutions. The pDNA is increasingly excluded from top phases upon the addition of 0.5% and 3% (w/w) NaCl. With 3% (w/w) NaCl, the logarithmic partition coefficient of RNA was 1.2 and as a result, the RNA concentration in the top phase was 3.3-fold higher than that in the bottom phase. It is demonstrated that 47%, 13.7% and 7.5% (w/v) of PEG were required to achieve identical precipitation effects with PEG 300, 1450 and 6000, respectively. The precipitation efficiency of 6.3% (w/v) PEG 300 corresponds to that of 1% (w/v) PEG 6000. The excluded volume effects in the top phase were probably responsible for the selective exclusion of different nucleic acids species. The results obtained in this study contribute to the basic knowledge of partition of macromolecules in ATPSs in terms of excluded volume theory.

Keyword: Aqueous two-phase systems; NaCl; Plasmid DNA; RNA; Selective partition.