
Manipulation of partition coefficients in ATPSs: understanding the addition of osmolytes and salts

Nuno DA SILVA¹, Pedro MADEIRA², José TEIXEIRA¹, Boris ZASLAVSKY³

¹ *Universidade do Minho, Portugal*

² *Universidade de Aveiro, Portugal*

³ *Cleveland Diagnostics, United States of America*

Efficient and economical downstream processing of biological products has been one of the main challenges of biotechnology industry. However, downstream methodologies have developed slowly and so new, fast and robust separation methods are urgently needed.

Aqueous two-phase systems (ATPSs) are long known to be a promising separation technique and a valuable alternative to conventional chromatography. For successful utilization of partitioning in ATPSs it is important to understand the mechanisms of solute distribution in the systems as well as the system properties at the molecular level.

It has been previously shown that the partition behavior of solutes in a given ATPS can be manipulated by adding salts and more recently, nonionic additives such osmolytes.

In this work, the effect of the addition of different osmolytes (sorbitol, sucrose, trimethylamine N-oxide and trehalose) and salts (NaCl and NaClO₄) was evaluated in PEG-Na₂SO₄ and PEG-DEX systems. Differences in the solvent properties of water in both the equilibrium phases and in the partition coefficients of a set of biological compounds were also assessed.

It was found out that the partition coefficient of all compounds examined may be described in terms of solute-solvent interactions. The results obtained in this study show that solute-solvent interactions of all compounds in PEG-Na₂SO₄ systems differ from those in PEG-DEX.