THE AQUEOUS PHASE BEHAVIOR OF POLYION-SURFACTANT ION COMPLEX SALTS MIXED WITH NONIONIC SURFACTANTS

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The aim of this project is to understand the phase and association behavior of soluble complex salts in aqueous solution. They consist of poly(acrylates) (PA) and a cationic surfactant ion of C\textsubscript{x}TA\textsuperscript{+} and are denoted C\textsubscript{x}TAPA\textsubscript{y}, where \(x\) is the number of carbons in the surfactant chain and \(y\) is the number of monomer units (or degree of polymerization) in the polyacrylate [1]. The solubility of the C\textsubscript{x}TAPA\textsubscript{y} complex salts in water varies and it increases when the complex salt is composed of a surfactant with short alkyl chain and a longer polyion [2]. In order to make the complex salts soluble, forming a composite self-assembled macromolecular aggregate, nonionic surfactants of the type C\textsubscript{i}E\textsubscript{j} (where E stands for poly(ethylene oxide), PEO) are added.

In this work four ternary phase diagrams of two different complex salts (C\textsubscript{16}TAPA\textsubscript{25} and C\textsubscript{16}TAPA\textsubscript{6000}) and two nonionic surfactants (C\textsubscript{12}E\textsubscript{5} and C\textsubscript{12}E\textsubscript{8}), thus varying both polyion length and PEO-chain length, were determined. The results showed that increasing EO-chain length and decreasing polyion length were factors promoting dissolution of the complex salt while the opposite resulted in large miscibility gaps and narrow one phase regions. In some cases a very rich phase behavior was observed. The basis of these effects are explained by considering the tuning of intermolecular interactions as polyion-length and PEO-chain length are varied.