

Thermodynamics of Interaction in Polymer-Surfactant Systems

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In the past decades, thermodynamics of the interactions in polymer-surfactant systems in aqueous solution has been given more attention in the academic research and industrial applications. The importance of such thermodynamic information is the ability not only to understand the mechanism of these interactions at the molecular level, but also for use in designing the specified molecular structure of polymer, surfactant and optimizing the polymer-surfactant systems with desired functional properties used for various practical applications. The interactions between polymer and surfactant is a inter- and intramolecular non-bonding weak interactions, such as hydrophobic interaction, electrostatic interaction, hydrogen bonding, Van der waale force, steric hindrance and so on, in which hydrophobic interaction plays a very important role. There are two ways to study such interaction thermodynamics: one way is the indirect way with large uncertainties, and another one is the direct way, i.e., calorimetry, especially microcalorimetry. In this presentation we will mainly report the following microcalorimetric results: 1) Aggregation of various polymer(hydrophobically modified and unmodified polymers)-surfactant (cationic, anionic and geminis)systems; 2) Effect of alkyl chain structure and type of surfactants and polymers on the interactions; 3) Effect of salinity on the interaction; 4) On the base of the calorimetric results, combining with other non-calorimetric results, the applying possibility of thermodynamic information in industrial applications will also be discussed.