Tuning of Coacervate Phase Behavior of Polyoxyethylene (4) lauryl ether in Aqueous Alcoholic Solution: Investigation of Thermodynamics

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Abstract

The influence of various additives on the coacervate phase behaviour of micellar solution of non-ionic surfactant was investigated. Above the critical micelle concentration, nonionic surfactant in aqueous solution shows phase separation, at cloud point (CP), an increase in temperature results in consequent changes in micellar size, shape, and interactions. The addition of external material to surfactant solution changes the temperature, at which clouding occurs. Herein we report how cloud point changes in presence of alcohol as additives. The CP temperature of non-ionic surfactant Polyoxyethylene (4) lauryl ether (Brij-30) was investigated at various concentrations of surfactant in pure and additives mixed systems. The results demonstrate that the CP of pure Brij-30 surfactant shows a decreasing trend with increasing surfactant concentration from 1 to 10 % (w/v) in a 22% aqueous ethanolic medium. Simultaneously the CP values of Brij-30 with n-alcohols show an increasing trend in the presence of C3OH and C4OH chain length alcohols, due to the fact that they remain in the solution helps the formation of expanded water structures hence favoring micelle hydration, while the presence of C5OH, C6OH and C7OH chain length alcohols showing decreasing trend due to increasing in micelle size. These changes in CP values of Brij-30 in presence of various n-alcohols are useful to study the effect of the structure of additives on the stability of micelle. The stability of micelle aggregation was also discussed by using foam ability and foam stability. The "Phase Separation Model "is useful for calculating thermodynamic parameters of clouding

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