INHIBITION OF MAGNESIUM IONS INDUCED PRECIPITATION FROM SODIUM DODECYL BENZENESULPHONATE−POLYMER MIXTURES BY APPLYING SODIUM CITRATE

Csaba Bús[1], Cora Deák[2], Pál Sipos[1]

[1]Department of Molecular and Analytical Chemistry, University of Szeged, H-6720 Szeged, Dóm tér 7-8, Hungary
[2] Department of Applied and Environmental Chemistry, Rerrich Béla square 1, 6720, Szeged, Hungary
e-mail: bus.csaba@szte.hu

Abstract

Among different type of surfactants, anionic surfactants are generally applied compounds to reduce interfacial tension (IFT) in various fields of industry. Polymeric solutions often possess high viscosity, these materials are commonly used for viscosity control [1]. Presence of divalent metal ions, especially alkaline earth cations in brine water is an important factor during different processes, because these cations considerably affect on both surfactant and polymer solutions. By binding to the surfactant's anionic head group, these cations may cause precipitation from surfactant solutions. Divalent cations are able to interact also with the polymer chains, decreasing the polymer's viscosity, enhancing the negative charge of the polymer chains; these phenomena may cause precipitation also in polymeric solutions [2, 3]. The present study is concerned with the experimental description of the interactions between magnesium ions and sodium dodecyl benzenesulfonate (SDBS)−Flopaam AN125SH mixtures and the complexation of magnesium with sodium citrate. The mixtures contained the polymer in 1.0 g/L concentration and the surfactant in 5.0 g/L concentration. The solvent's magnesium ion content was increased between 0.03−1.5 g/L, and sodium citrate was added to the magnesium ion containing samples in 2.0 and 3.0 molar equivalent relative to the magnesium ion concentration. The samples were characterized by using turbidimetry and rheology measurements (determining consistency index, yield stress, flow number and zero shear viscosity). The infrared spectra of the solid precipitates were also recorded.

The results indicated that sodium citrate is an effective agent to inhibit the magnesium ions caused precipitation up to 1.2 g/L metal ion concentration. Addition of sodium citrate considerably decreased the viscosity of the samples (the consistency index of the SDBS−polymer mixtures decreased from 47.5 mPas to 7.53 mPas), moreover, addition of magnesium ions even in high amounts did not cause the precipitation of the polymer. Nevertheless, the presence of sodium citrate decreased the polymer's viscosity, but according to the rheological parameters all samples were described to possess pseudoplastic flow behavior.

References

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