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Thermochimica Acta 289 (1996) 1–7

thermochimica acta

Thermal transition from viscoelastic to newtonian fluid in aqueous solution of 1 : 1 CTAB: o-iodophenol complex

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Received 22 April 1996; accepted 13 June 1996

Abstract

Thermally induced transition in aqueous solution of 1 : 1 intermolecular complex formed between cetyltrimethylammonium bromide (CTAB) and o-iodophenol was studied by using a high-sensitive scanning microcalorimeter DASM 4 in the temperature range between 20 and 80°C. A heat capacity peak was observed at temperature around 55°C. The peak temperature depended strongly on the heating rate, indicating highly kinetic nature of the transition. The enthalpy change associated with the transition was found to depend significantly on stored period of the solution at room temperature. These observations were discussed in terms of possible structural change of micellar aggregates in association with the change in flow property of the solution during warming. Origin of slow kinetics of the self-assembly and disassembly processes of the complex in the solution is inferred.

Keywords: Calorimetry; Surfactant; Molecular complex; Viscoelasticity; Micellar aggregates

1. Introduction

Aqueous solutions of some amphiphilic molecules exhibit striking viscoelastic behavior. The viscoelasticity can be seen easily by simply swirling the solution and visually observing the recoil movement of air bubbles trapped in the solution after the swirling motion is stopped. The viscoelasticity of aqueous solutions of ionic surfactants is known to be enhanced if a third component is added to the solution [1]. The effects of additives on the fluidity of surfactant solutions were examined as a function of composition. Cetyltrimethylammonium bromide CTAB mixed with o-iodophenol is

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PII: S0040-6031(96)03038-9