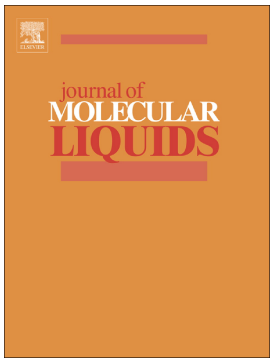

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A Green and Easy Synthesis Method of Catanionic Surfactant Ammonium Benzenesulfonate and Its Surface Properties and Aggregation Behaviors

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Abstract

Catanionic surfactants play a prominent role in the biotechnology, drag-reduction agents, microreactors and other fields, but the catanionic surfactants are all synthesized from halogenated quaternary ammonium salts or dimethyl sulfated quaternary ammonium salts more or less. In this context, we put forward a new synthetic method without halogenated organics or dimethyl sulfated organics to improve the conventional method. Quite different, a typical catanionic surfactant ammonium benzenesulfonate was synthesized from tertiary amine, dimethyl carbonate and dodecylbenzenesulfonic acid. The structure of the product was established using various techniques, fourier transform infrared spectroscopy (FT-IR), H-nuclear magnetic resonance (^{1}H-NMR), C-nuclear magnetic resonance (^{13}C-NMR), electrospray ionizsation mass spectrometry (ESI-MS). Also, the surface activities and aggregations of ammonium benzenesulfonate were detected by equilibrium surface tension and dynamic surface tension, contact angle, dynamic light scattering (DLS). Our results provide proofs for the successful synthesis of ammonium benzenesulfonate and the explanations for the surface properties and aggregation behaviors.

Keywords

Ammonium benzenesulfonate; green synthesis; surface/interface properties; aggregation behavior

1 Introduction

Different from the conventional surfactants, catanionic surfactants have been well known for their prominent properties, dramatically low critical aggregation concentrations, high surface activities and spontaneous vesicle formation, owing to the strong electrostatic interaction between the head groups of cationic surfactant and anionic ones [1-6]. Herein, these unique properties can be employed in many applications, such as biotechnology, drag-reduction agents, microreactors and model membranes. For example, Youngjin Kim modulated the single-walled carbon nanotubes by the method of dielectrophoresis of surface conductance using catanionic surfactants which were