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Study of Interaction between Ionic Liquids and Orange G in Aqueous Solution with UV-Vis Spectroscopy and Conductivity Meter

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Abstract:

The interactions between Orange G (OG) with three kinds of ionic liquid surfactants (C_{10}mimBF_4, C_{12}mimBF_4, C_{16}mimBF_4) and CTAB were studied with UV-Vis spectra and conductivity measurements. The systematic changes in UV-Vis spectra with an increase of carbon-chain length may be observed in presence of OG. They correspond to CMC of every system, respectively, and the CMCs of four systems have exhibit the decrease of CMCs compared to pure surfactant. The binding constants are calculated from the results of conductivity measurements in the order of C_{16}mimBF_4 > CTAB > C_{12}mimBF_4 > C_{10}mimBF_4. Furthermore, system behaviors presented significant association of complex formation and micelles formation, i.e. the change in UV-Vis spectra before and after the formation of micelles in mixed systems. In addition, Fourier-transform infrared (FT-IR) spectroscopy and ^{1}H NMR analysis further confirmed that the complexes are formed by hydrogen bond and van der Waal force. These findings could provide scientific guidance for extraction and separation of dyes.

Keywords: Ionic liquid surfactants, Orange G, CMC, binding constant, ^{1}H NMR, FT-IR