

Measurement of Critical Microemulsion Concentration of Supercritical Carbon Dioxide Microemulsion Using UV-Vis Spectroscopy

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Supercritical carbon dioxide microemulsions, as the proper mediums to overcome the low polarity of Supercritical carbon dioxide, have drawn much attention in recent years. They can be used in chemical reactions, biological macromolecule extraction, nanoparticle material synthesis, and so on. The phase behavior and critical microemulsion concentrations of these mediums are important to engineering applications. Critical microemulsion concentration is the minimal concentration of surfactant to form supercritical carbon dioxide microemulsion. In this work, a UV-Vis spectroscopy method has been used to study the critical microemulsion concentration of supercritical carbon dioxide microemulsion with AOT as a food surfactant and Methyl orange (MO) as a solvatochromic probe. The absorbencies of MO in the supercritical carbon dioxide microemulsion with various concentration of surfactant AOT at wavelength of 410 nm have been measured at a constant temperature and a constant molar ration of water to AOT. The experimental results show that the absorbency of MO in the Supercritical carbon dioxide microemulsion increases as the AOT concentration and the absorbency suddenly changes in a very narrow range of concentration of AOT from 0.003M to 0.004M. This especial AOT concentration range has been taken as the critical microemulsion concentration, which is consistent with the results we obtained in our earlier measurements of cloud points for the same system.

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