

Thermodynamics of Supercritical Fluids and the Applications for Preparing Microemulsions

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We studied the microemulsions in supercritical (SC) CO₂, the effect of compressed CO₂ on the structures of reverse micelles in organic solvents, and the reverse micelles of copolymers induced by compressed CO₂, and some of the related applications were also investigated. The results demonstrated that non-fluorous nonionic surfactants, Dynol-604, Ls-36, Ls-45, and Ls-54, are soluble in SC CO₂. The phase behavior and UV-vis studies showed that the Dynol-604 and Ls-54 could form reverse micelles in SC CO₂. The microemulsions could solubilize methyl orange (MO) and biomacromolecules, indicating the existence of polar micro-aqueous environments. The results of synchrotron radiation SAXS suggest that the radii of the Dynol-604 based and Ls-54 based reverse micelles are in the ranges of 73.8–78.1 and 20.4–25.2, respectively. The Ag, ZnS, and CdS nanoparticles, and ZnS/CdS and ZnS/PAM composite nanoparticles synthesized in sodium bis(2-ethylhexyl) sulfosuccinate (AOT) reverse micelles were recovered by dissolving antisolvent CO₂ into the micellar solution.