Phase Behaviors of Micro-Emulsions with Carbon Dioxide Including the 2,2,3,3,3-Pentafluoro-1-Propanol Surfactant and Water

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Phase behaviors for the carbon dioxide + 2,2,3,3,3-pentafluoro-1-propanol binary system and the carbon dioxide + 2,2,3,3,3-pentafluoro-1-propanol + water ternary system were investigated at temperature from 313.2 to 353.2 K. The cloud points of this surfactant were measured, and the supercritical fluid phase behavior of water in the CO_2 micro-emulsion was investigated by using a visual and variable volume equilibrium analyzer. A transparent phase was observed above the upper phase transition pressure and cloudy phase emulsions appeared between the upper and the lower phase transition pressures. Vapor and liquid phases were clearly separated below the lower phase transition pressure. Cloud phase transition pressures for the carbon dioxide + 2,2,3,3,3-pentafluoro-1-propanol binary system were increased with increasing temperatures and amount of carbon dioxide. Upper cloud phase transition pressures and lower cloud phase transition pressures for the carbon dioxide + 2,2,3,3,3-pentafluoro-1-propanol + water ternary system were increased with increasing temperatures.