

Thermodynamic Consideration on Phase Behavior of the Ternary Two-Phase System of Water, Nonane, and Ethylene Glycol Monobutyl Ether

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The phase behavior of a ternary two-phase system composed of water, nonane, and ethylene glycol monobutyl ether (C4E1) was investigated thermodynamically. The compositions of the water and nonane phases were measured precisely as a function of the total concentration of C4E1 and temperature under atmospheric pressure by gas liquid chromatography. A new kind of criterion of ideality for the two-phase equilibrium was proposed and examined by using the composition data obtained. The composition region of ideal dilute solution behavior was determined for the two phases as a function of temperature. It was suggested that the formation of the aggregate of C4E1 in the water phase is enhanced at lower temperatures and that in the nonane phase at higher temperatures, respectively. Furthermore the entropy and enthalpy of transfer of ether molecules from the water to the nonane phase were evaluated not by calorimetry but by applying the thermodynamics to the composition data. The transfer was found to accompany the positive entropy and be endothermic.