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Full Papers

水与正丁醇二元体系最低共沸混合物的热容

南照东[a,*], 谭志诚[2], 邢军[2]

[1]曲阜师范大学化学系, 曲阜 273165

[2]中国科学院大连化学物理研究所热化学实验室, 大连 116023

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摘要 用精密绝热量热计测定了由水和正丁醇组成的最低共沸混合物在78 至320 K温区的热容，并建立了该体系热力学函数和温度的定量函数关系。根据测定的热容曲线表明, 最低共沸混合物在111.9±1.2 K发生玻璃态转变，179.26±0.77 K和269.69±0.14 K发生固-液相变。还计算了其相变焓和相变熵。考虑了物理贡献和化学贡献两部分的作用，拟合了超额热容与温度的函数关系。讨论了物理贡献和化学贡献两部分的作用对超额焓和超额熵的影响。

关键词 绝热量热学, 热容, 超额热容, 最低共沸混合物, 水, 正丁醇

分类号

Measurements of the Heat Capacity of an Azeotropic Mixture

NAN Zhao-Dong*,[1], TAN Zhi-Cheng[2], XING Jun[2]

[1] Department of Chemistry,Qufu Normal University,Qufu,Shandong 273165,China

[2] Thermochemistry Laboratory,Dalian

Abstract Molar heat capacities of *n*-butanol and the azeotropic mixture in the binary system [water (x=0.716) plus *n*-butanol (x=0.284)] were measured with an adiabatic calorimeter in a temperature range from 78 to 320 K.The functions of the heat capacity with respect to thermodynamic temperature were established for the azeotropic mixture. A glass transition was observed at (111.9±1.2) K. The phase transitions took place at (179.26±0.77) and (269.69±0.14) K corresponding to the solid-liquid phase transitions of *n*-butanol and water, respectively. The phase-transition enthalpy and entropy of water were calculated. A thermodynamic function of excess molar heat capacity with respect to temperature was established, which took account of physical mixing, destructions of self-association and cross-association for *n*-butanol and water, respectively. The thermodynamic functions and the excess thermodynamic ones of the binary systems relative to 298.15 K were derived based on the relationships of the thermodynamic functions and the function of the measured heat capacity and the calculated excess heat capacity with respect to temperature.

Key words adiabatic calorimetry heat capacity excess heat capacity azeotropic mixture water *n*-butanol

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通讯作者 南照东 zdnan@163.com