

热力学

HCl-NaCl-C₂H₆O₂-H₂O体系中HCl热力学

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摘要 在乙二醇和水为混合溶剂中加入HCl和NaCl组成四元系, 在恒定溶液总离子强度 $I=1.00\text{mol}\cdot\text{kg}^{-1}$, 改变混合溶剂中乙二醇质量分数 w (5%、15%和20%) 的条件下, 组成下列电池

Pt, H₂(10⁵Pa) | HCl(m), C₂H₆O₂(w), H₂O (1- w) | AgCl-Ag (A)

Pt, H₂(10⁵Pa) | HCl(m_A), NaCl(m_B), C₂H₆O₂(w), H₂O (1- w) | AgCl-Ag (B)

根据测得电池(A)的电动势, 确定混合溶剂中AgCl-Ag电极的标准电极电动势, 讨论了HCl的迁移性质. 利用电池(B)的电动势, 计算出HCl的活度系数 γ_A . 结果表明, 在溶液中总离子强度保持恒定, HCl的活度系数服从Harned规则. 在溶液组成恒定时, $\lg\gamma_A$ 是温度倒数 $1/T$ 的线性函数, 进一步讨论了混合物中HCl的相对偏摩尔焓.

关键词 [热力学](#) [活度系数](#) [离子强度](#) [Harned规则](#) [电动势](#)

分类号

THERMODYNAMICS OF HCl IN SYSTEM OF HCl-NaCl-C₂H₆O₂-H₂O

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Abstract

The thermodynamic property of HCl-NaCl-C₂H₆O₂-H₂O system were studied by means of emf measurement in the cells without liquid junction

Pt, H₂(10⁵Pa) | HCl(m), C₂H₆O₂(w), H₂O (1- w) | AgCl-Ag (A)

Pt, H₂(10⁵Pa) | HCl(m_A), NaCl(m_B), C₂H₆O₂(w), H₂O (1- w) | AgCl-Ag (B)

at a constant ionic strength $I=1.00\text{mol}\cdot\text{kg}^{-1}$ and mass fraction of glycol in the mixed solvent, equating to $w=5\%, 15\%$ and 20% , respectively, at temperature ranging from 278.15 to 323.15K. The standard electrode potential of Ag-AgCl in the mixed solvent were determined from cell (A). The activity coefficients of HCl γ_A in the mixed solvent system were determined from cell (B). The results show that the activity coefficients of HCl in HCl-NaCl solutions still obey the Harned's rule and $\lg\gamma_A$ is a linear function of the reciprocal of the absolute temperature at constant composition of the mixture. Relative molar enthalpies of HCl L_A are linear function of the ionic strength fraction of NaCl at constant total ionic strength and temperature. The standard transfer Gibbs free energies of HCl from water to mixed solvent were calculated.

Key words [thermodynamics](#) [activity coefficients](#) [ionic strength](#) [Harned's rule](#) [emf](#)

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