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双电解质溶液HCl-H₂O-MCl_n (M=Ni, Cu, Na, Fe) 中水活度系数的计算

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摘要: 将水溶液中电解质处理成它们的分子形式而不是它们的离子形式, 并基于两电解质之间的相互作用能相对于它们与水的相互作用能可以忽略这一假设前提, 提出了简化的正规溶液模型, 以计算双电解质溶液体系HCl-H₂O-MCl_n (M=Ni, Cu, Na, Fe) 中水的活度系数。模型中所包含的两个参数为组元对的相互作用能, 由实验数据估算了所讨论体系中涉及的5个组元对的相互作用能。不同双电解质体系得到的HCl-H₂O组元对的相互作用能极为吻合, 表明所提出的模型是合理的。

关键字: 活度系数 正规溶液 电解质溶液

ACTIVITY COEFFICIENTS OF WATER IN AQUEOUS SOLUTION OF DOUBLE ELECTROLYTES, HCl AND MCl_n (M=Ni, Cu, Na AND Fe)

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Abstract: In order to calculate the activity coefficients of water in the aqueous solution systems of double electrolytes, HCl and MCl_n (M=Ni, Cu, Na and Fe), a simplified regular solution model has been derived based on the assumption that the electrolytes in the aqueous solution can be treated as independent particles instead of their ion forms, and that the interaction of the component pair HCl-MCl_n in the aqueous solution is very weak as compared with the component pairs HCl-H₂O and H₂O-MCl_n. The interchange energies of the component pairs in the discussed systems, $\omega_{\text{HCl-H}_2\text{O}}$, $\omega_{\text{H}_2\text{O-NiCl}_2}$, $\omega_{\text{H}_2\text{O-CuCl}_2}$, $\omega_{\text{H}_2\text{O-NaCl}}$ and $\omega_{\text{H}_2\text{O-FeCl}_3}$, have been evaluated from the experimental data to be $-69400\text{J}\cdot\text{mol}^{-1}$, $-212600\text{J}\cdot\text{mol}^{-1}$, $-90550\text{J}\cdot\text{mol}^{-1}$, $-42450\text{J}\cdot\text{mol}^{-1}$ and $-198310\text{J}\cdot\text{mol}^{-1}$. The interchange energy $\omega_{\text{HCl-H}_2\text{O}}$ between HCl and H₂O component pair

obtained from four different double electrolyte solution systems is almost the same within experimental errors, which indicates that the present model is reasonable to certain extent.

Key words: activity coefficient regular solution electrolyte solution

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