

HEAT CAPACITY OF THREE-COMPONENT SYSTEMS CONTAINING AMMONIUM IODIDE, N-METHYLPYRROLIDONE AND WATER

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In this work, the heat capacities C_p of solutions of ammonium iodide in a mixed solvent MP-water were measured with high accuracy over the entire range of compositions at 298.15 K. Heat capacity measurements were performed on the LKB 8700 calorimetric unit with an error of $2 \cdot 10^{-3}$ J/g·K. On the basis of the data obtained, the apparent molar heat capacities of Φ_c were calculated, extrapolating the concentration dependences of which to the state of infinite dilution the standard partial molar heat capacities of ammonium iodide in the mixed solvent MP-water at 298.15 K were determined. To separate the values $\overline{C_{p,2}^\circ}$ of ammonium iodide into ionic components, we used our data on the iodide ion in MP and MP-water mixtures [1] and the additivity condition of partial molar quantities. The values $\overline{C_{p,l}^\circ}$ are shown in the table.

Standard partial molar heat capacities $\overline{C_{p,l}^\circ}$ of ammonium ion
in the mixed solvent MP-water at 298.15

	X_{MP}						
	0,00	0,10	0,33	0,50	0,75	0,90	1,00
$\overline{C_{p,l}^\circ}$, J/mol·K	4	-12	-14	25	49	73	78

Compared with alkali metal ions, where the values $\overline{C_{p,l}^\circ}$ increase monotonously, the dependence on the composition of the mixed solvent for the ammonium ion is extreme: at low concentrations of MP, a minimum is observed, and at high concentrations, a maximum. In the entire range of compositions of the MP-H₂O mixture, the values $\overline{C_{p,l}^\circ}$ of NH₄⁺ are higher than those of alkali metal ions, and the inversion of values occurs with a lower content of MP. This indicates the complex nature of intermolecular interactions in the studied solutions, which is significantly influenced not only by the properties of the MP-water binary system, but also by the structural behavior of the ammonium ion.

1. Novikov A. N. // Russ. J. Phys. Chem. A . 2011. Vol. 85, N 9. P. 1546–1549.

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