Effect of Temperature on the Activity Coefficient of Amino Acids in Aqueous Solutions

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Osmotic and activity coefficients have been reported for small amino acids in aqueous solutions at 298.15K [1-2] and have been evaluated using different models [3-6]. In this work osmotic coefficient of glycine, DL-alpha-alanine and acid DL-alpha-amino butyric in aqueous solutions were measured by the isopiestic method [7] at temperatures of 288.15 K, 293.15 K and 298.15 K. The amino acids were chosen to examine the effect of increase in the number of CH_2 groups. Experimental osmotic coefficients were used to calculate water activity, solute activity coefficients and the results are compared with literature data.

The McMillan–Mayer solution theory allows the formal separation of effects which arise from molecular pair, triplet and higher order interactions. Using experimental results, excess Gibbs energy values were related with solute molality to obtain the free energy pairwise interaction coefficients of glycine, DL-alpha-alanine and acid DL-alpha-amino butyric in water.

The magnitude and sign of solute–solute interactions are related to the changes in thermodynamic properties of solute molecules in aqueous solution. The temperature dependence of the interaction coefficients is interpreted in terms of amino acid hydration.

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