Mutual Diffusion Coefficients of Concentrated 1:1 Electrolyte from the Modified Mean Spherical Approximation

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Mutual diffusion coefficients of concentrated 1:1 electrolyte solutions are investigated in the framework of the primitive model. The modified mean spherical approximation, in which the effective cationic diameter is a function of total ionic strength, is applied to the evaluation of the equilibrium pair correlation function, and the Smoluchowski equation is used for the dynamics. The obtained expressions for the mutual diffusion coefficients have been examined by the comparison with the experimental data of 18 uni-valence electrolyte solutions at the molar concentrations up to 4.0 mol/L. Good agreement between theoretical results and the experimental mutual diffusion coefficients are found for all the cases studied in this work.

Keywords: mutual diffusion coefficient; electrolyte solution; MSA