

Developing a Universal Activity Correlation for Strong Electrolyte Systems

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Electrolyte systems are ubiquitous in a large number of areas, and they are also one of the most challenging classes of systems to be modeled due to the strong electrostatic interactions of the ions and the water in aqueous solutions. While many solution models exist and have been demonstrated to capture the phase behavior of electrolyte solutions, all of them are system specific and have a number of fitted parameters dependent on the type of electrolyte. Recently, we have discovered a universal correlation that describes the activity of water and electrolytes in a very simple way, regardless of the electrolyte type and concentration that is valid for single and mixed electrolyte systems. The correlation is based on an effective mole fraction that accounts for the charge and stoichiometry of the ions in solution, which suggests that the activity of the species in solution is ion-size independent. We will demonstrate how the correlation was developed and how it compares with experimental data and other commonly used models for electrolyte systems.