Redefinition of the Boiling Point Elevation Equation Through Consideration of Various Aspects of Solute Nature on the Magnitude of Ion-Dipole Interactions in Aqueous Solutions

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The colligative properties of solutions, including the boiling point elevation, are said to be only dependent on concentration of particles dissolved, not the identity of the particles; however, departures from this statement are evident in experimental data and can be explained by examining the original cause of the boiling point elevation. Due to the increased distance between the charge center of an ion and the pole of a water of hydration as the radius of the ion increases, the electrostatic potential of the ion-dipole interaction decreases by an amount proportional to the reciprocal of the ionic radius according Coulomb's law. If one is to consider that the boiling point elevation of a solution is attributed to the energy required to overcome the interactions between the solute particles and the waters of hydration in the first hydration shell, the absence of the factor of the electrostatic potential of the ion-dipole interactions in the existing nature-independent model seems to account for the variation between experimental data and the existing, ionic radius independent model. By incorporating the electrostatic potential into the boiling point elevation equation, a more complete and more accurate mathematical model of boiling point elevation can be established.

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