Gibbs Energies

Salt solutions

Pitzer’s Equations

The Debye-Huckel treatment of the properties of salt solutions is based on a linearization of the Botzmann Equation leading to an equation for the radial distribution function, \( g_{ij}(r) \). If a further term is taken into the expansion, the equation for \( g_{ij}(r) \) takes the following form \[1\].

\[
g_{ij}(r) = 1 - q_{ij} + \left( \frac{q_{ij}^2}{2} \right) \quad (a)
\]

When equation (a) was tested against the results of a careful Monte Carlo calculation the conclusion was drawn that the three-term equation is good approximation \[2\]. The result is a set of equations for both the practical osmotic coefficient \( \phi \) and mean ionic activity coefficient for the salt in a solution having ionic strength \( I \) \[3,4\]. The theory has been extended to consider the properties of salt solutions at high T and p \[5,6\]. In fact key parameters in Pitzer equations covering extensive ranges of T and p have been extensively documented \[7\]. The Pitzer treatment has been extended to a consideration of the properties of mixed salt solutions \[8\].

Footnotes

[4] Activity and Osmotic Coefficients for


(c) For 3:2 salts etc;


[5]


(c) P. P. S. Salija, K. S. Pitzer and R. C. Phutela, Can J.Chem., 1986, 64, 1328.