

REPRESENTATION OF SALT SOLUBILITY IN MIXED SOLVENTS: A COMPARISON OF THERMODYNAMIC MODELS

Simão P. Pinho and Eugénia A. Macedo



*Laboratory of Separation and Reaction Engineering
Faculty of Engineering
University of Porto
Portugal*

ABSTRACT

A simple and accurate apparatus for the measurement of salt solubilities in mixed solvents by an analytical method is presented. Salt solubility data have been measured for the systems water/methanol/NaCl, water/methanol/KCl at 298.15 and 323.15 K and for the system water/ethanol/NaCl at 298.15, 323.15 and 348.15 K.

○ To correlate the solubility data two models are proposed:

🍏 One assumes that the salt in solution is in the molecular form and the original UNIQUAC model with linear temperature dependent parameters is used.

🍏 The other takes into consideration the salt dissociation and the original UNIQUAC model is combined with a Pitzer-Debye-Hückel expression to take into account the long-range interaction forces.

In order to simplify the solubility calculations a new formulation is presented involving the symmetric convention for all species. This makes possible the direct access to the solubility product of the salt in terms of its thermodynamic properties. Both models correlate satisfactorily the solubility data although both temperature and electrostatic effects are very important in this type of equilibrium calculations.