Journal of Solution Chemistry, Vol. 33, No. 8, August 2004 (© 2004)

Ionic Interactions of Calcium Sulfate Dihydrate in Aqueous Calcium Chloride Solutions: Solubilities, Densities, Viscosities, and Electrical Conductivities at 30°C

Arvind Kumar,[1,*] V. P. Mohandas,[1] V. R. K. S. Susarla,[1] and P. K. Ghosh[1]

Received December 23, 2003; revised April 29, 2004

Different physicochemical properties such as solubilities, densities, viscosities, and electrical conductivities of calcium sulfate dihydrate in aqueous calcium chloride solutions have been measured at 30°C to examine the ionic interactions in the system. Density values have been used to calculate the mean apparent molar volumes of ternary mixtures. Viscosity values have been analyzed using different empirical equations and the experimental values of viscosity were combined with conductivity values to get the Walden product. The experimental data have been fitted by a polynomial equation for least-squares analysis to obtain the coefficients and the standard errors. Results have been examined in the light of the "structure making" or "structure breaking" effect of the various ions present in the solution.

KEY WORDS: Solubilities; densities; viscosities; electrical conductivities; mean apparent molal volumes; ionic interactions.

1. INTRODUCTION

As a continuation of our studies[1] on ionic interactions of $CaSO_4 \cdot 2H_2O$ in aqueous solutions of certain electrolytes, we have measured different thermodynamic, volumetric, and transport properties, such as solubilities, densities, viscosities, and electrical conductivities, for the system, $CaSO_4 \cdot 2H_2O$–$CaCl_2$–H_2O. Thermodynamic and other physicochemical properties of multicomponent electrolyte mixtures in water are important in understanding the ionic equilibria in natural waters. When dealing with aqueous solutions of electrolytes, the fundamental question is how the structure of water around the ions changes, depending on the

[1]Central Salt and Marine Chemicals Institute, Bhavnagar 364002, India; e-mail: mailme_arvind@yahoo.com

0095-9782/04/0800-0995/0