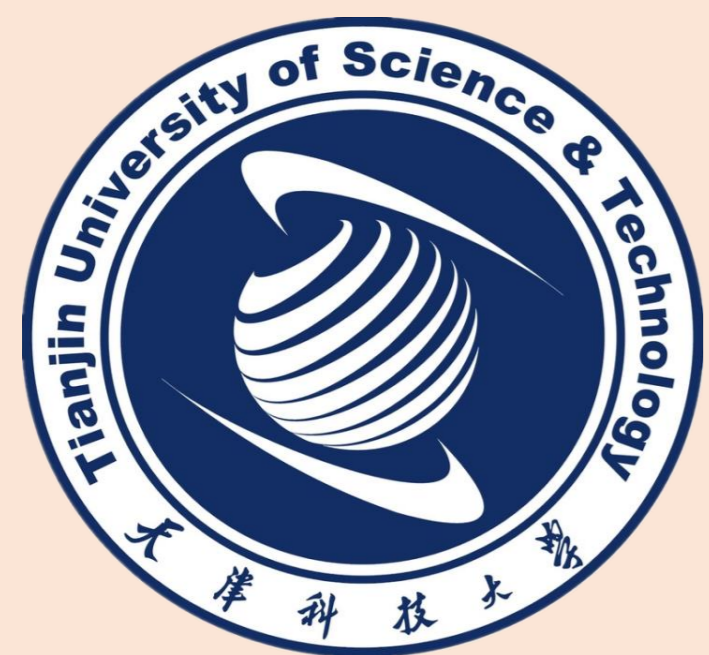


Activity coefficients of sodium nitrate and cesium nitrate in aqueous mixtures using an electromotive force method at 298.15 K

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1. Introduction

Cesium, a rare alkalecent metal, it mainly occurs in alkali rocks and salt lake, is of a wide range of applications in modern hi tech area¹. It is essential to study the average activity coefficient of electrolyte solution for the design, development of processes. And it is of great significance to determine the activity coefficients of salt solution parts in salt industry.



Fig. 1 Application of cesium salts

2. Experimental Method



Fig. 2 PHSJ - 4F Ion meter

The electromotive force method^{2,3} was used in this study. Each concentration of the above solutions was prepared by directly weighing the materials using a Sartorius electronic balance whose accuracy was 0.1 mg. Voltage readings were taken as final when they were constant within 0.2 mV for at least 5 min.

3. Results and Discussion

- The activity coefficients of NaNO₃-CsNO₃-H₂O system at 298.15 K are reported for the first time. The results show that in this ternary system, the activity coefficient changing regular with the changing of the mole fraction.
- Using multiple linear regression fitted the Pitzer mixed ion parameters of the system and finally calculated the mean activity coefficient of CsNO₃ ($\gamma_{\pm\text{CsNO}_3}$) in the mixed system, water activity (a_w), permeability coefficient (Φ) and excess Gibbs free energy (G^E).
- On the basic of series of the activity coefficients of NaNO₃-CsNO₃-H₂O system, the reliable mixing interaction parameters θ_{MX} and ψ_{MNX} were obtained based on the modified Pitzer ion-interaction theory.

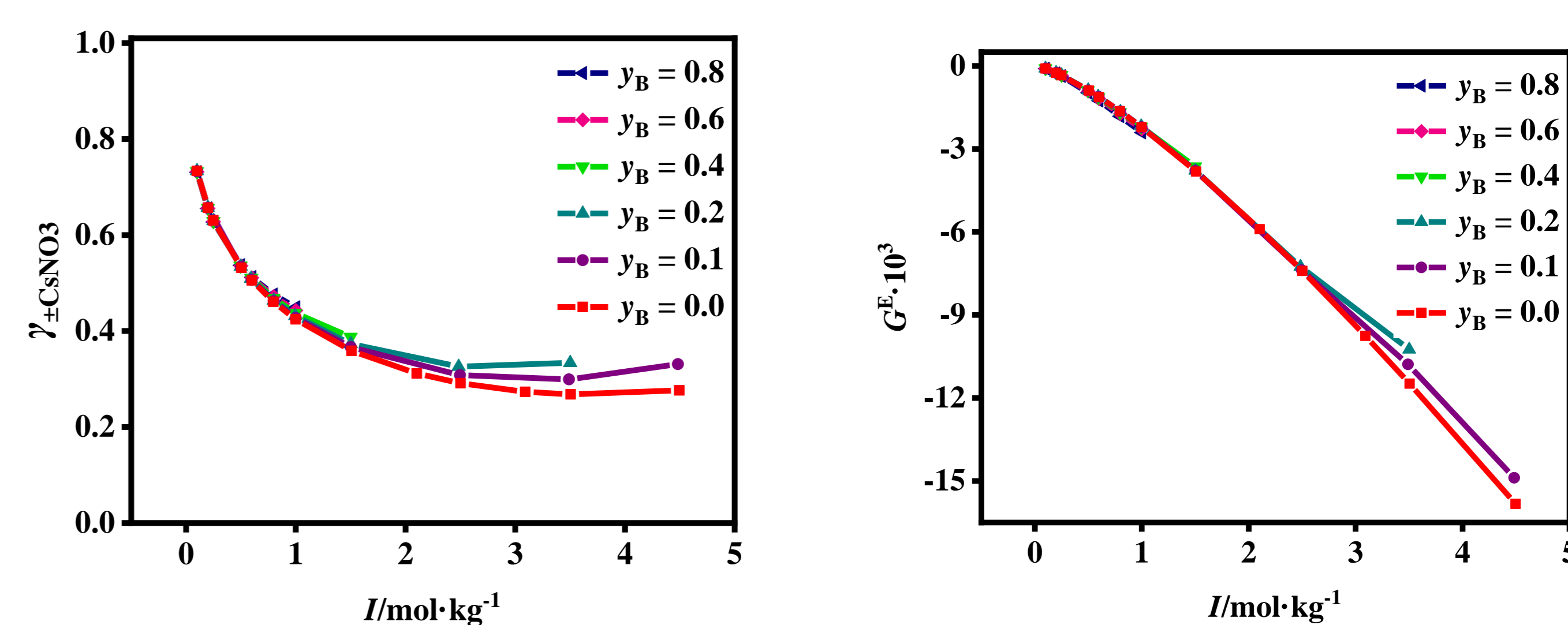


Fig. 3 The activity coefficients of CsNO₃ and excess Gibbs energies of NaNO₃-CsNO₃-H₂O against their ionic strength at 298.15 K

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