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1 Introduction

Boron and its compounds play an important role in modern energy and material sciences including permanent magnetic, superconducting, boride cermets, boron-based fuel-rich propellants and borate whisker materials^[1]. Lithium metaborate is a high-quality piezoelectric material for mobile communication, and lithium pentaborate can be used as a high quality laser material and so on^[2].



Fig. 1 Salt lakes in Qinghai-Tibet Plateau

2 Experimental Apparatus



Characters:

- 3D sensors;
- 77~473 K, 0.01-2 K/min;
- $T \pm 0.001$ K;
- 0.10 W, RMS 1 W.

Application:

- ΔH_{mix} ; ΔH_{dil} ; ΔH_{sol} ; C_p

BT 2.15 (Setaram, France)

The samples were loaded under the standard membrane mixing cell, and the water was in the upper, which was separated by polyethylene film. When the baseline of the heat flow became stable, the pole of membrane mixing cell was pressed down, meanwhile the peristaltic pump was turned on to ensure the sufficient contact of the aqueous and water.

3 Results and Discussion

- The apparent molar enthalpies of LiBO_2 and LiB_5O_8 aqueous solution at 298.15 K are reported for the first time. It reveals that the different changing regular of the apparent molar enthalpy against molality in the binary systems ($\text{LiBO}_2 + \text{H}_2\text{O}$) and ($\text{LiB}_5\text{O}_8 + \text{H}_2\text{O}$), respectively.
- As to the former system, the apparent molar enthalpies of LiBO_2 solution first increased slowly then increased sharply with increasing molalities. However, when the molalities of LiB_5O_8 solution increased, the apparent molar enthalpies increased steadily.
- On the basis of series of the enthalpies of dilution of LiBO_2 (aq) and LiB_5O_8 (aq), the reliable single-salt-parameters $\beta^{(0)L}_{\text{MX}}$, $\beta^{(1)L}_{\text{MX}}$, $\beta^{(2)L}_{\text{MX}}$, C^L_{MX} of $\text{LiB}(\text{OH})_4$ and $\text{LiB}_5\text{O}_6(\text{OH})_4$ were obtained based on the modified Pitzer ion-interaction theory.

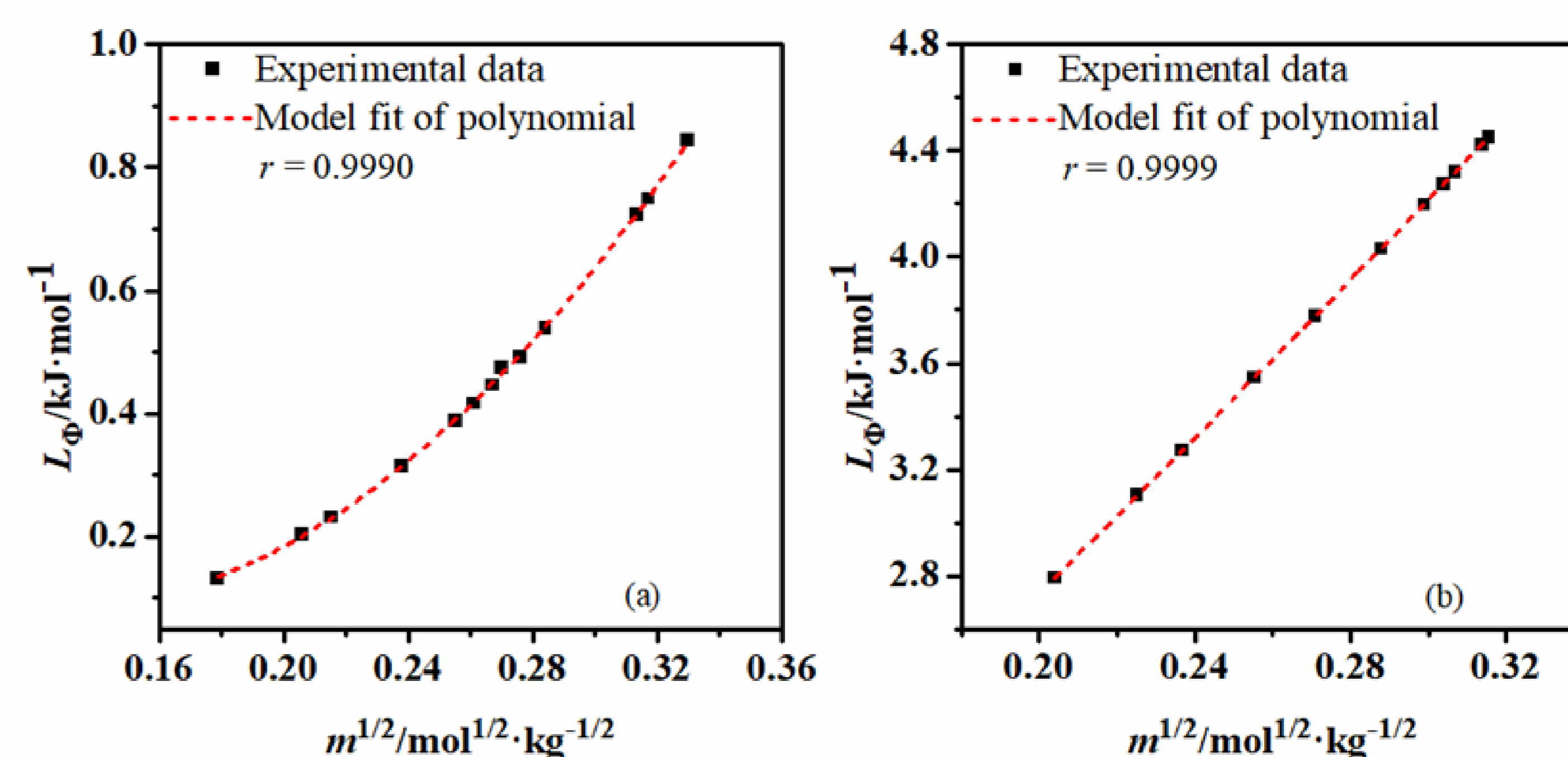


Fig. 2 The apparent molar enthalpies of LiBO_2 / LiB_5O_8 against their molality of $\text{LiBO}_2(\text{aq})$ or $\text{LiB}_5\text{O}_8(\text{aq})$ at 298.15 K. (a), $\text{LiBO}_2 + \text{H}_2\text{O}$; (b), $\text{LiB}_5\text{O}_8 + \text{H}_2\text{O}$.

Precision calorimeter technique was employed for dilution enthalpy measurement. Apparent molar enthalpies and the reliable single-salt-parameters $\beta^{(0)L}_{\text{MX}}$, $\beta^{(1)L}_{\text{MX}}$, $\beta^{(2)L}_{\text{MX}}$, C^L_{MX} of $\text{LiB}(\text{OH})_4$ and $\text{LiB}_5\text{O}_6(\text{OH})_4$ at 298.15 K were obtained. The calculated apparent molar enthalpies agree well with the experimental values.

References

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