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Comment on “Volumetric properties of aqueous solution of lithium tetraborate from 283.15 to 363.15 K at 101.325 kPa” [J. Chem. Thermodyn. 120 (2018) 151–156] and its Corrigendum [J. Chem. Thermodyn. 123 (2018) 195–197]

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ABSTRACT

Inconsistencies in the apparent molar volume values for aqueous lithium tetraborate solutions reported by Guo and co-workers are exacerbated in the Corrigendum by Cao and co-workers. At 363 K the discrepancies relative to the corrected values in this work exceed 20 cm³ mol⁻¹ and 100 cm³ mol⁻¹ near 0.01 mol kg⁻¹ for Guo et al. and Cao et al., respectively.

TEXT

The purpose of this short communication is to alert readers to an ongoing problem with the published volumetric data for aqueous lithium tetraborate. Recently, Guo et al. [1] reported density values for such solutions in the temperature range from (283.15 to 363.15) K and molality from (0.01 to 0.12) mol kg⁻¹. Apparent molar volumes, V_ϕ , for Li₂B₄O₇(aq) were calculated according to Eq. (1)

$$V_\phi = \frac{1000(\rho_w - \rho_s)}{m\rho_w\rho_s} + \frac{M}{\rho_s} \quad (1)$$

where ρ_w is the density of pure water at the same pressure and temperature as the measurement, ρ_s is the density of the lithium tetraborate solution, m is the molality of the solution (moles of Li₂B₄O₇ per kg of water) and M (= 169.12 g mol⁻¹) is the molecular mass of Li₂B₄O₇.

While entering these data into our JESS database, we found that the densities and apparent molar volumes reported by Guo et al. [1] were not in accord with Eq. (1). Cao et al. [2] also recognised this issue and published a Corrigendum to Guo et al.'s [1] apparent molar volumes. However, in attempting to address the issue Cao et al. [2] have used ρ_w values differing from those recommended by IAPWS (International Association for the Properties of Water and Steam) [3] (Fig. 1). This leads to significant discrepancies. Values of V_ϕ consistent with the

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