

Conductivity and molar conductivity of LiOD heavy water solution

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The LiOD heavy water solution has been used as electrolyte in Pd-D₂O electrolytic system over 30 years, its conductivity not only affects the electrical and thermal properties but also can be used to determine the LiOD concentration easily [1,2]. In this paper, conductivities of LiOD heavy water solution (0.01 ~ 1 mol·L⁻¹) at different temperatures (10 ~ 70°C) were measured as shown in Fig. 1. The conductivity κ in mS·cm⁻¹, concentration c in mol·L⁻¹ and temperature T in °C can be simulated as a quadratic form:

$$\kappa = 61.8c - 17.64c^2 + 2.47cT - 0.3828c^2T$$

This equation is simplified to:

$$\kappa = 123.55c - 27.21c^2$$

and the concentration can be expressed as:

$$c = 8.094 \times 10^{-3} \kappa + 1.443 \times 10^{-5} \kappa^2$$

at 25°C. The corresponding molar conductivities are analyzed based on solution theory. It is found that the simulated values are consistent with experimental data within 3% for LiOD concentration of 0.01 ~ 0.5 mol·L⁻¹.

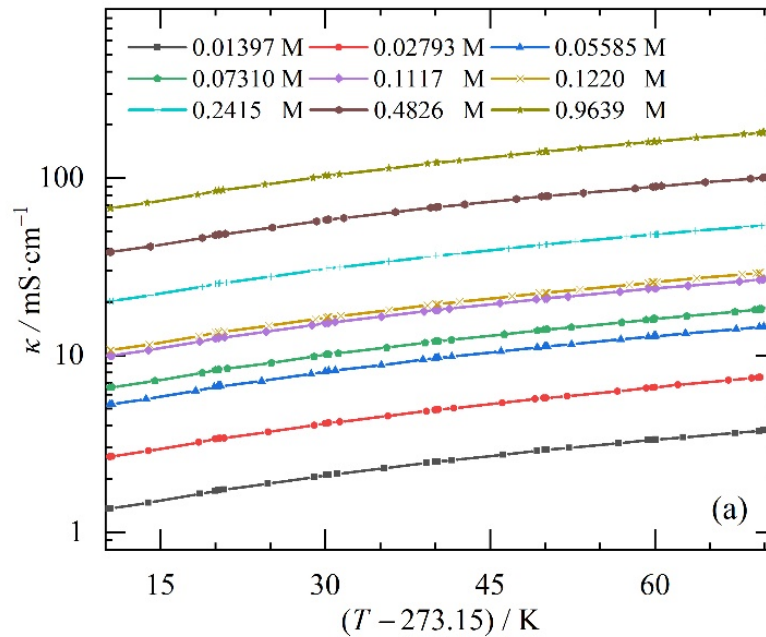


Fig. 1. Conductivities of LiOD heavy water solution at different temperatures and concentrations.

References:

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- [2] K.A. Ritley, P.M. Dull, M.H. Weber, M. Carroll, J.J. Hurst and K.G. Lynn. The behavior of electrochemical cell resistance; a possible application to cold fusion experiments, Fusion Tech. **17** (1990) 699–703.