

Accepted Manuscript

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PII: S0140-7007(18)30141-5
DOI: [10.1016/j.ijrefrig.2018.04.025](https://doi.org/10.1016/j.ijrefrig.2018.04.025)
Reference: IJIR 3966



To appear in: *International Journal of Refrigeration*

Received date: 13 March 2018
Revised date: 12 April 2018
Accepted date: 22 April 2018

Please cite this article as: Han Wang , Qing Cheng , Wei Feng , Wenhao Xu , Experimental and theoretical research on the electrical conductivity of a liquid desiccant for the liquid desiccant air-conditioning system: LiCl aqueous solution, *International Journal of Refrigeration* (2018), doi: [10.1016/j.ijrefrig.2018.04.025](https://doi.org/10.1016/j.ijrefrig.2018.04.025)

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Experimental and theoretical research on the electrical conductivity
of a liquid desiccant for the liquid desiccant air-conditioning system:

LiCl aqueous solution

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Highlights

- Experiment on the electrical conductivity of LiCl aqueous solution was conducted.
- The conductivity model when polynomial degrees are both 3 is most suitable.
- The COP improves with the decrease of temperature and the increase of concentration.
- The maximum COP is about 5 when LiCl concentration is 36% and temperature is 22°C.
- The effect of LiCl temperature on the COP is larger than that of the concentration.

Abstract

At present, the energy consumption in buildings occupies a large proportion of total energy use, and air-conditionings cost a large proportion of energy in the buildings. The liquid desiccant air-conditioning system has a good energy saving potential and the electro dialysis (ED) regeneration is a reliable choice for the liquid desiccant regeneration. In order to establish the energy consumption model and the performance coefficient model of liquid desiccant air-conditioning system based on ED regeneration using LiCl, experimental and theoretical research on the electrical conductivity of LiCl aqueous solution with a lot of concentrations and temperatures was conducted in this paper. The results show that when polynomial degrees of the mass concentration and the temperature of the LiCl aqueous solution are both 3, the electrical conductivity model for the LiCl aqueous solution is most suitable as its simplicity and high accuracy. Moreover, when the concentration is 36% and the temperature is 22°C, the liquid desiccant cooling system has the maximum COP of about 5. Finally, a case study of a small

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