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# Research on membrane absorption air-conditioning system with more than one stage

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## Abstract

To overcome the worldwide energy poverty and climate change, greener buildings are urgently needed. The air-conditioning system, as a huge energy consumer in buildings, must be more energy conservative and environment friendly. Absorption air-conditioning system is an idea option except for its low performance caused by energy waste in the thermal regeneration process. That can be improved with the membrane regeneration method driven by electric power. However, the performance is unstable with higher concentration difference. Double-stage membrane system can solve this problem by reducing the concentration difference, but yet lacks experiment support. To improve, theoretical and experimental work has been made: Experiments have been conducted to test the true performance. Based on which, analysis has been made on some influential parameters. It has revealed the influences of the solute concentration, voltages, temperatures and the transferred solute mass. The double-stage system has better performance as the energy efficiency increases with the decreasing concentration difference. Under some conditions, the performance of the double-stage system is 20% higher than that of the single-stage system. When the absorbent solution is LiBr, the maximum coefficient of performance of the double-stage system can be higher than 3. That makes it a promising system for future application.

*Keywords:* Air-conditioning; Energy conservation; Membrane regeneration; Performance

## 1. Introduction

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