

Study on a compact silica gel–water adsorption chiller without vacuum valves: Design and experimental study

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Abstract

A compact silica gel–water adsorption chiller without vacuum valves was manufactured and experimentally studied. This chiller contains two adsorption/desorption chambers and one chilled water tank. Each adsorption/desorption chamber consists of one adsorber, one condenser and one evaporator. The chilled water tank is adopted to mitigate the variation of the chilled water outlet temperature. A mass recovery-like process, which is a heat recovery process between the two evaporators, was carried out in this chiller. A novel heat recovery process was also fulfilled after the mass recovery-like process to improve the coefficient of performance (COP). The cooling power and COP were 9.60 kW and 0.49 respectively when the average hot water inlet temperature, cooling water inlet temperature, and chilled water outlet temperature were 82.0, 31.6 and 12.3 °C, respectively.

Keywords

- Refrigeration;
- Adsorption chiller;
- Water;
- Silica gel;
- Heat and mass recovery