

Performance improvement of a combined double-way thermochemical sorption refrigeration cycle with reheating process

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Abstract

A reheating process is proposed aimed at improving the system performance of a combined double-way thermochemical sorption thermodynamic cycle based on adsorption and resorption refrigeration. The reheating process causes an increase in the driving equilibrium temperature difference, which promotes the reaction rate and thus improves the global conversion of sorbent. Experimental results showed that the proposed reheating process is an effective technique for improving the performance of the combined double-way cycle. The improvement in the COP ranged between 12 and 48% in the different cycle conditions, when compared with the combined double-way cycle without reheating. The low pseudo-evaporation temperature and high heat sink temperature can further improve the system performance. The COP obtained with the combined double-way cycle without reheating was 0.57, when the heat sink, evaporation, and pseudo-evaporation temperatures were 25, 10, and 10°C, respectively. However, at the same cycle conditions, the COP increased to 0.64 when the proposed reheating process was introduced in the combined double-way sorption cycle. © 2009 American Institute of Chemical Engineers AIChE J, 2010

Keywords:

- sorption refrigeration;
- thermochemical;
- thermodynamic cycle;
- adsorption;
- resorption;
- reheating process