Performance investigation of advanced adsorption desalination cycle with condenser–evaporator heat recovery scheme

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\textbf{ABSTRACT}

Energy or heat recovery schemes are keys for the performance improvement of any heat-activated cycles such as the absorption and adsorption cycles. We present two innovative heat recovery schemes between the condensing and evaporating units of an adsorption desalination (AD) cycle. By recovering the latent heat of condenser and dumping it into the evaporative process of the evaporator, it elevates the evaporating temperature and hence the adsorption pressure seen by the adsorbent. From isotherms, this has an effect of increasing the vapour uptake. In the proposed configurations, one approach is simply to have a run-about water circuit between the condenser and the evaporator and a pump is used to achieve the water circulation. This run-around circuit is a practical method for retrofitting purposes. The second method is targeted towards a new AD cycle where an encapsulated condenser–evaporator unit is employed. The heat transfer between the condensing and evaporative vapour is almost immediate and the processes occur in a fully integrated vessel, thereby minimizing the heat transfer resistances of heat exchangers.

\textit{Keywords:} Desalination; Adsorption; Heat recovery; Solar energy

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