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Modeling and exergy analysis of domestic MED desalination with brine tank

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ABSTRACT

Desalination systems are taken into account as one of the promising solutions to deal with the water scarcity problem. Among different kinds of desalination systems, having the advantages like using low grade thermal resources, multi-effect type is getting popular more and more. Considering the mentioned issues, in this study, a high performance multi-effect desalination (MED) system is introduced and the enhancement potential of that is evaluated in details. The introduced and reference designs are compared together from different points of view. The results showed that not only the fresh water production of the introduced MED device is enhanced from the range of 12–16 to 14–21.6 L h^{-1} compared to the base case condition, but also gained output ratio increases up to 30%–40%. Moreover, the conducted exergy analysis shows that with the exergy efficiency of 82%, the brine tank has the highest performance among other components, while the exergy destruction for this part is negligible compared to the other parts. Therefore, a high level of improvement can be achieved using the introduced design.

Keywords: Brine; Desalination; Energy efficiency; Wastewater treatment; Seawater desalination technology

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