

Experimental investigation of a novel passive solar still with additional condensation on sidewalls

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ABSTRACT

In common solar stills, a portion of the produced vapor undesirably condenses on the sidewalls and runs down to be mixed with saline water in the basin. This results in lower distillate output of the system. The aim of this study was to improve the condensation process of a solar still without complicating its structure to collect the water condensed on sidewalls. The proposed solar still was made of two containers nested one inside the other such that the smaller container, containing saline water, fitted easily into the larger container. There was a thin gap between the two in which condensed liquid on sidewalls, ran down and was collected from the bottom of the larger container. The results showed that the daily efficiency reached 55.5% in the current system from the 29.72% corresponding to conventional solar still. On average, 38.5% of the yield was collected from the gap between sidewalls and the rest was obtained from the glass cover. The amount of daily yield and its cost per liter (CPL) were 5.85 kg/m² and 0.0069 \$/L m², respectively. Additionally, the placement of fins on the system's outer surfaces showed no improvement from both economical and performance standpoints.

Keywords: Desalination; Passive solar still; Enhanced condensation

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