

Comparative study of a conventional solar still with different basin materials using exergy analysis

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ABSTRACT

Among today's world problems, drinking water shortage is one important thing. Solar distillation is a simple and efficient solution to solve this problem, but the yield produced from solar distillation is low. The incorporation of thermal energy storage materials in the solar still is one of the solutions to enhance the yield. For enhancing the yield, solar stills were fabricated using high thermal conductivity materials and tested on three consecutive days in June 2020 in the same climatic conditions. Three solar stills are single slope solar still with a steel plate (SSS-SP), SSS with a zinc plate (SSS-ZP) and SSS with a copper plate (SSS-CP). The maximum total drinkable water production from the SSS-SP, SSS-ZP and SSS-CP is equal to 3.35, 3.96 and 4.51 kg/m², respectively. The daily drinkable water production increased by 18.21% when using zinc plates and 34.63% when using the copper plate, related to the SSS-SP. The maximum daily exergy efficiency of the SSS-SP, SSS-ZP and SSS-CP are equal to 1.9%, 2.39% and 3.08%, respectively. The daily exergy efficiency was increased by 26.13% when using zinc plate and by 61.57% when using the copper plate, compared to the SSS-SP.

Keywords: Solar energy; Zinc plate; Copper plate; Energy storage; Freshwater

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