

An Experimental Investigation on Productivity and Performance of an Improved Design of Basin Type Solar Still

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Abstract : Due to population growth, the need for drinkable healthy water is highly increased. Consequently, and since the conventional sources of water are limited, researchers devoted their efforts to oceans and seas for obtaining fresh drinkable water by thermal distillation. The current work is dedicated to the design and fabrication of modified solar still model, as well as conventional solar still for the sake of comparison. The modified still is single slope double basin solar still. The still consists of a lower basin with a dimension of 1000 mm x 1000 mm which contains the sea water, as well as the top basin that made with 4 mm acrylic, was temporarily kept on the supporting strips permanently fixed with the side walls. Equally ten spaced vertical glass strips of 50 mm height and 3 mm thickness were provided at the upper basin for the stagnancy of the water. Window glass of 3 mm was used as the transparent cover with 23° inclination at the top of the still. Furthermore, the performance evaluation and comparison of these two models in converting salty seawater into drinkable freshwater are introduced, analyzed and discussed. The experiments were performed during the period from June to July 2018 at seawater depths of 2, 3, 4 and 5 cm. Additionally, the solar still models were operated simultaneously in the same climatic conditions to analyze the influence of the modifications on the freshwater output. It can be concluded that the modified design of double basin single slope solar still shows the maximum freshwater output at all water depths tested. The results showed that the daily productivity for modified and conventional solar still was 2.9 and 1.8 dm³/m² day, indicating an increase of 60% in fresh water production.

Keywords : freshwater output, solar still, solar energy, thermal desalination

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