MATHEMATICAL MODELING FOR OUTPUT YIELD OBTAINED BY SINGLE SLOPE SOLAR STILL INTEGRATED WITH SAND TROUGHS

by

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The crisis for potable water is inevitable, due to increasing population. Solar desalination is apt technology to convert brack water and sea water into potable one. In the current work a mathematical modeling of a single slope solar still integrated with sand troughs is presented. The model is validated with the experimental results of a solar still with 3 cm of water level at the basin. The mathematical model findings and results obtained with the experimental investigations are within ±10% deviation. Capillary effect was proposed to obtain the yield daily basis and thermal effect model was integrated with the capillary effect model. From the results, it is understood that the yield obtained is more in the case of solar stills with sand troughs when compared to solar stills without sand troughs. Further the model is used for predicting yield for 1 cm and 2 cm of water levels at the basin. It is observed that the maximum yield was obtained for 1 cm water level at the basin. There is a good agreement between theoretical results and experimental results. It shows that the still produce better yield with the lower depth of water level at the basin, this may be because of the availability of more space in the sand for evaporation due to capillary effect in the troughs.

Keywords: *mathematical modeling, solar still, sand troughs, capillary effect model, yield, still efficiency*

Introduction

Nowadays, having good quality water for healthy living has become more complicated and costly. The shortage is increasing every day. Solar still is proven to be a successful technology to purify sea water and can cater the needs of safe drinking water. By using the same effect pool system, water is cheaper, safer and more environmentally friendly [1]. The 96% of the earth's water is seawater which is salty and we cannot use for many applications. It

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