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Effect of sponge liner on the internal heat transfer coefficients in a simple solar still

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ABSTRACT

In the present study, an attempt has been made to enhance the productivity of a solar still by increasing temperature difference between water and glass, using sponge liners at the inner wall surfaces. Two conventional basin still units were fabricated with the same design parameters. The experimental studies were conducted on the simple solar still with various thicknesses of sponge liners like 3, 5, 7, 10 and 12 mm. To evaluate the convection heat transfer correlation *C* and *n*, a thermal model is developed in the present work by using the experimental observations. The regression analysis is used to develop thermal model. Also a mathematical model has been developed to predict the water, glass temperature and mass of distilled output. The values of convection and evaporation heat transfer coefficients obtained in thermal model have been used in the mathematical model. From the experimental and analytical studies, it is concluded that, (i) sponge liner stills works towards increasing the temperature difference between water and glass by reducing the temperature of glass, (ii) The values of convection heat transfer coefficient and evaporation heat transfer coefficient differ for a particular condition and a particular model of solar still, (iii) The present studies have proved that there is a definite need to modify the values of *C* and *n* to predict the exact performance of solar stills, (iv) The internal heat transfer coefficients which are evaluated by thermal model have been found best suitable for theoretical model to get good agreement with experimental results.

Keywords: Solar still; Sponge liner; Heat transfer coefficients; Thermal model; Thickness

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