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## PERFORMANCE OF AN ACTIVE SOLAR STILL COUPLED TO EVACUATED TUBE COLLECTOR

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### Abstract

In this study, the experimental performance of a single slope solar still coupled with an evacuated tube collector was investigated. A single slope passive solar still (PSS) and single slope active solar still (ASS) integrated with an evacuated tube collector were fabricated with an area of 1 m<sup>2</sup> and tested in the composite climate of Coimbatore, Tamilnadu, India, (Latitude: 11°N; Longitude: 77°E and an altitude of 409 m above sea level). High water temperatures in the range of 84.2°C were achieved by the active solar still compared to the values 69°C for passive solar still due to the additional thermal energy supplied by the evacuated tube collector. The daily yields obtained from the solar stills were 3.9 kg/m<sup>2</sup>day and 7.14 kg/m<sup>2</sup>day for PSS and ASS, respectively, at a water depth of 0.05 m. Other parameters including water depth and annual yield were also studied. A theoretical model was developed based on the energy balances for the different components of the solar still and validated with experimental results. It has been found that the theoretical results are agreed well with experimental results. The lowest annual cost of distilled water for ASS was Rs.0.75/kg for 10% of interest rate. Water quality analysis was also carried out to find its suitability for drinking purposes.

*Key words:* active solar still, economic analysis, evacuated tube collector, water quality

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