

## Evaluation of productivity enhancement of a solar still coupled with flat solar collector and parabolic trough under medina climate

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### ABSTRACT

Convictional solar stills coupled with either flat plate collector (FPC) or parabolic trough concentrator (PTC) have been investigated in different condition sets. In this experimental study, double slope solar still (DSSS) is coupled with FPC or PTC and the test was extended further to the coupling of both collectors to find out the performance of these different setups under the meteorological condition of the city of Medina west of Arabia. The three devices are connected in series where circulated water is heated first by FPC and then by PTC before entering a heat exchanger in a basin of DSSS. It has been found that solar still productivity can be improved substantially by such coupling. The experimental result shows that the accumulated yield from the standalone still, coupled with PTC, still coupled with FPC, and still coupled with both were 2.85, 4.27, 6.41, and 7.63 L/m<sup>2</sup>/d, respectively. The increase of productivity using these different enhancers were 61%, 142%, and 170%, respectively. Also, the experimental investigation found that the water temperatures increased by about 9% for solar still integrated with PTC to about 27% for solar still integrated with the two collectors relative to standalone solar still under similar climate conditions.

**Keywords:** Double slope solar still; Improved solar still yield; Solar desalination; Flat solar collector; Parabolic trough; Active solar still; Solar energy

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