

## Effects of Concentrator and Encapsulated Phase Change Material for Desalination: An Experimental Study

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**Abstract :** An experimental attempt has been made to study the effect of system integration by two different concentrator assisted desalting systems. The compound parabolic concentrator (CPC) and compound conical concentrator (CCC) are used in this research work. Two solar desalination systems, the single slope solar still (SSSS) and pyramid solar still (PSS), have been integrated with a CCC and compound parabolic concentrator-concentric circular tubular solar still (CPC-CCTSS). To study the effect of system integration, a thick cloth prevents the entry of sunlight into the solar still top. Additionally, the concentrator assisted desalting systems are equipped with phase change material (PCM) for enhancement. In CCC-SSSS, PCM has been filled inside copper balls and placed on the SSSS basin. The PCM is loaded in the specially designed circular trough of the tubular solar still. Here, the used concentrators and distillers are not the same. Two methodologies are followed here to produce the fresh water even while the distillers are blocked from the sunlight. They are (1) thermosyphon effect in CCC-SSSS and (2) waste heat recovery from CPC-CCTSS. The results showed that the productivity of CCC-SSSS, CCC-SSSS with PCM and CCC-SSSS (PCM) top cover shaded were found as 2680 ml / m<sup>2</sup> / day, 3240 ml / m<sup>2</sup> / day, and 1646 ml / m<sup>2</sup> / day. Similarly, the productivity of the CPC-CCTSS-PSS, CPC-CCTSS (PCM)-PSS and CPC-CCTSS (PCM)-PSS top cover shaded were found as 7160 ml / m<sup>2</sup> / day, 7346 ml / m<sup>2</sup> / day, and ml / m<sup>2</sup> / day. The productivity of the CCC-SSSS and CPC-CCTSS-PSS is examined, and conclusions are drawn such as the solar radiation blocked distillers productivity did not drop to zero.

**Keywords :** compound conical concentrator, compound parabolic concentrator, desalination, system integration

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