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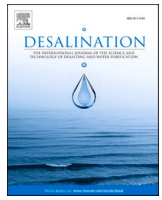

An extensive review of performance enhancement techniques for pyramid solar still for solar thermal applications

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HIGHLIGHTS

- Review researchers advancements made to the pyramid solar still to enhance the distillate output.
- Different aspects in improving the performance of a pyramid solar still discussed in tabular form.
- Scope of further research & recommendations of pyramid solar still is also presented.

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ABSTRACT

Due to the rapid increase on world population, the demand for potable water is also getting increased. The solar distillation process is one among the prominent options, for those facing shortage of water in rural areas. Many researchers have put tremendous effort in designing a solar still with better efficiency in the last decade. Current review article demonstrates the recent studies carried out on pyramid solar still to enhance the distillate output. It includes the use of use of fins, phase change materials, coatings, flat plate collector, and evacuated tube collector to enhance the distillate output of pyramid solar still. Comparison of various parameters for different solar distillation system and various aspects in improving the performance of a pyramid solar still also discussed in tabular form. At last, Scope of further research & recommendations for Pyramid solar still is added for help to researchers.

1. Introduction

The dependency on traditional methods utilizing renewable energy source for healthy and safe water is grooming across the globe. The presence of water is that fundamental necessity for all people and animals alive on earth especially in arid region, isolated areas and deserts. Many solar still designs that enhance freshwater productivity have been evolved in the last three decades. Nayi et al. [1] states that earth contains abundant of water, which covers approximately over two-third of its area. The greater part of the accessible water in present scenario is available as seawater or icecaps or combined with soil moisture within glacial areas. Over 97% world's water becomes not use for drinking purpose, 2% of clean water using drinking and other uses. Both forms don't seem to be easily reachable for human purpose. About 1% of the remaining water is to be accessed by all life on earth. Unfortunately, rapid increase of world's population leads to shortage of water

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Notations

%: percentage
°C: degree Celsius
cm: centimetre
Cr_2O_3: chromium oxide
h: hour
H_2O: water
kg: kilogram
l: litre
m: meter
MJ: mega Joule
ml: millilitre
mm: millimetre
W: Watt
Zn: zinc

Abbreviations

TE: thermal efficiency
EE: exergy efficiency
PCM: phase change material
Deg: degree
Al: aluminium
GI: galvanized iron
PVC: poly vinyl chloride
DC: direct current
win: winter
sum: summer
pass: passive
Act: active
SSS: simple solar still
CSS: conventional solar still
ETHP-SC: evacuated tube heatpipe solar collector
PSS: pyramid solar still
MSS: modified solar still
CCSSS: concentrator coupled single slope still
DBGSS: double basin glass solar still
HSS: hemispherical solar still
TSS: tubular solar still
CPCPSS: concentric parabolic collector pyramid solar still
MPSS: modified pyramid solar still
CPSS: conventional pyramid solar still
TPSS: triangular pyramid solar still
MSSPSS: multi-side step square pyramid solar still
SGSP: salt gradient solar pond
CWPSS: cords wick pyramid solar still
TBSS: triangular basin solar still
CBSS: conventional basin solar still
SBSPSS: single basin square pyramid solar still
MPSSRC: modified pyramid solar still rotating cylinder
SPSS: square pyramid solar still