ISSN PRINT 2319 1775 Online 2320 7876

Research paper UGC CARE Listed (Group -I) Journal Volume 10, Iss 4, 2021

Double slope solar still using lanthanum cobalt oxide nanoparticles coated wick

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Abstract:

In the present work synthesize of $LaCoO_3$ nanomaterial via solgel self ignition mehod with various water flow rates of 0.050; 0.10; and 0.20 kg/min. Nanomaterial blended with black paint coated int the basin area of the the proposed double slope system The morphological and structural properties is examined by the XRD & SEM. Prepared material having structure of porous and crystalline with 86%. Those material enhanced the heat transfer distiller achieved the productivity of 5.40 and 3.85 kg/ m^2 . day with and without coating respectively. They used Dunkle correlation to analyze theoretically. Porous wick materials helps to separate the water droplet.

Introduction:

Dwivedi and Tiwari [1] comprehensively conducted and compared several thermal models investigate the heat transfer behavior within passive solar distiller under wintertime & straw-hat with three various aquatic pits (0.03, 0.02, 0.01 m). It was noticed that there was an insignificant effect in the convective HTCs when the aquatic pits are increased about 0.01 m - 0.03 m. Tiwari and Tripathi [2] have experimentally considered water depth about 0.12, 0.1, 0.05m, heat transfer performance of an active solar distiller. It was indicated that the evaporative and convective HTCs between internal cover and water were remarkably affected water of depth of the still. Tiwari and Tiwari [3] developed an improved internal heat transfer of solar distiller. It demonstrated that the existed modeling revealed more accurate values of evaporative and convective HTCs of the solar distiller compared to Kumar and Tiwari model [4]. Sorayan and Shukla [5] developed correlation internal HTCs were shown in fit verification between experimental and theoretical findings. They reported a dunkle's correlations were not valid for the large titling cover of glass and the spacious distance inbetween evaporating & condensing surfaces.

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Fig. 1. photographic view of DSWSD.

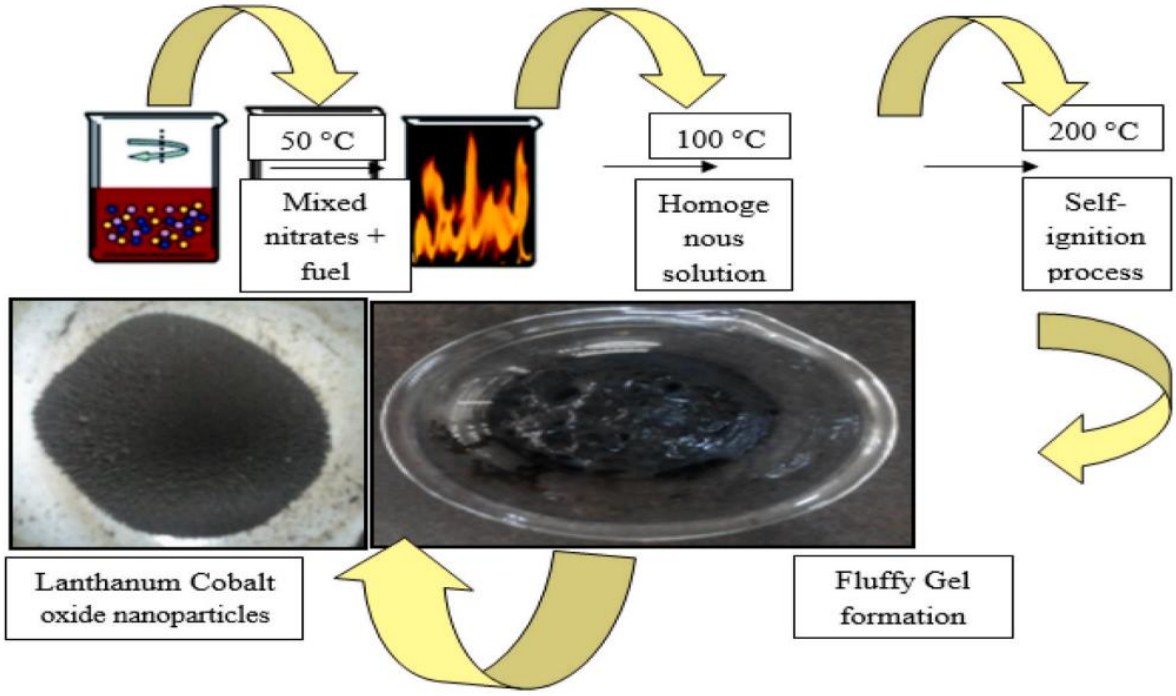

Fig. 2. Sol-gel self-ignition reaction.

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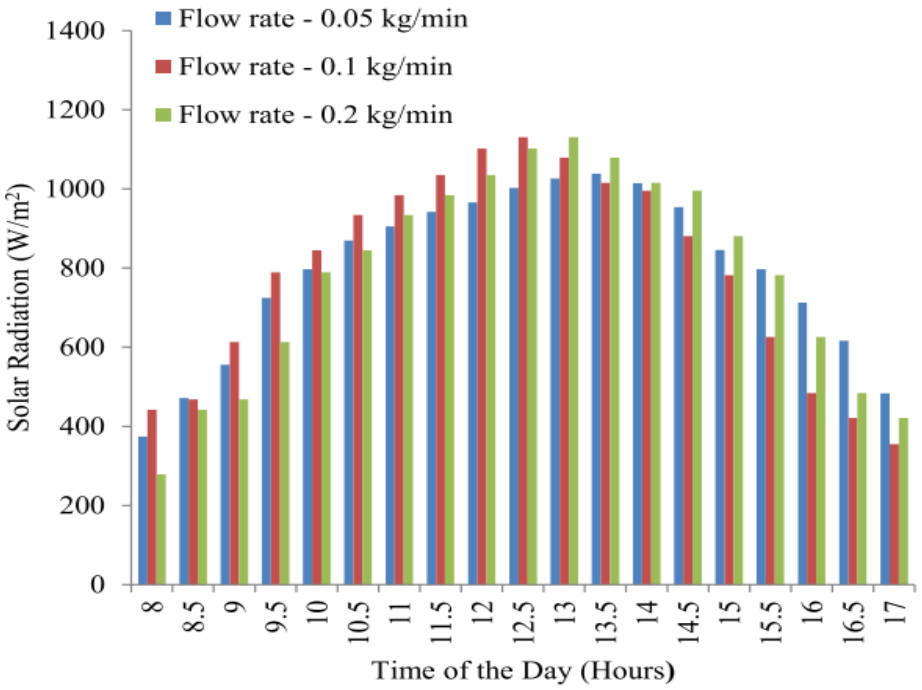

Fig 3. Solar Radiation variation

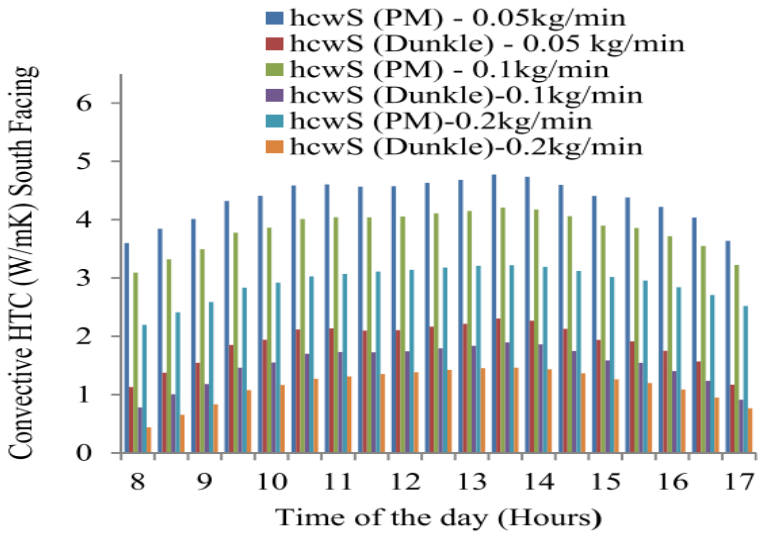

Fig. 4 Variations in HTCs

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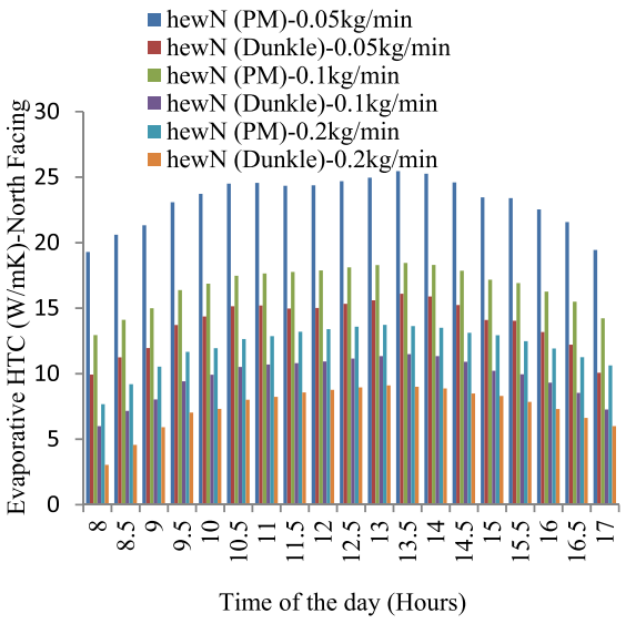

Fig. 5 Variations in HTCs

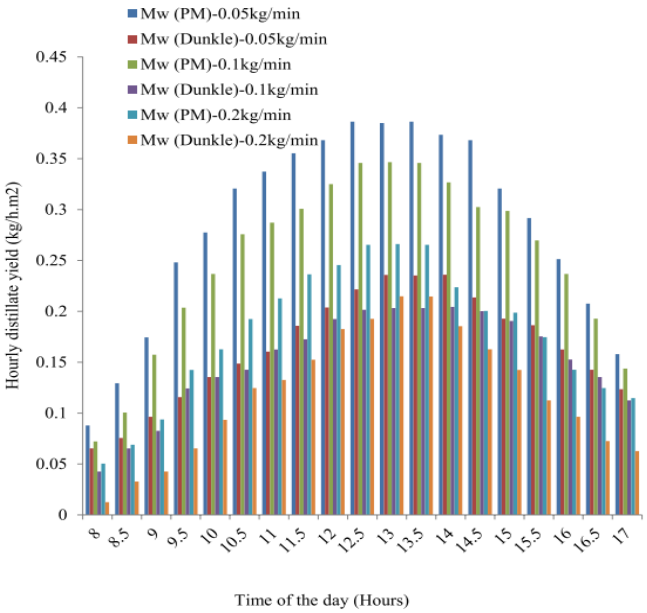

Fig.6 Hourly productivity

ISSN PRINT 2319 1775 Online 2320 7876

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Conclusions

In that chapter author attained at the lower flow rate attained the highest evaporation system then automatically enhanced the productivity of the still. It shows 0.050 kg/min achieved 85˚C. Best performance of the distiller attained by 20.0 wt% LaCoO3/black paint is compared to that of conventional DSWSD without LaCoO3/black paint. Using $LaCoO_3$ nanoparticles distiller was reached 5.40 and kg/ m^2. day Flow rate is the only parameter to reach high output.

Reference

[1] V.K. Dwivedi, GN. Tiwari, Comparison of internal heat transfer coefficients in passive solar stills by different thermal models: An experimental validation, Desalination, 246, 2009. https://doi.org/10.1016/j.desal.2008.06.024.

[2] R. Tripathi, GN. Tiwari, Effect of water depth on internal heat and mass transfer for active solar distillation, Desalination, 173, 2005. https://doi.org/10.1016/j.desal.2004.08.032.

[3] AK. Tiwari, GN. Tiwari, Effect of Inclination of Condensing Cover and Water Depth in Solar Still for Maximum Yield: In Winter Climatic Condition, ASME 2005 International Mechanical Engineering Congress and Exposition, 2005. https://doi.org/10.1115/IMECE2005-82690.

[4] S. Kumar, GN. Tiwari, Estimation of internal heat transfer coefficients of a hybrid (PV/T) active solar still, Solar Energy, 83, 2009. https://doi.org/10.1016/j.solener.2009.06.002.

[5] SK. Shukla, VPS. Sorayan, Thermal modeling of solar stills: an experimental validation, Renewable Energy, 30, 2005. https://doi.org/10.1016/j.renene.2004.03.009.