

## Double-slope solar still using activated carbon nanoparticle

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### Abstract

The necessity for expensive energy storage in the basin area required by solar distillation methods to boost output supports the value of natural green dyes as a desirable technique. The current research was done to see if adding different amounts of matte black paint (BP) and activated carbon nanoparticles (ACNPs) to the sidewalls of a double-sloped U-shaped stepped basin solar still (DUSS) may boost output. It was created using *Mangifera indica* and *Celostia argentea* ACNP, and samples of carbon powder with doped ZnO nanoparticles were used for testing. The newly proposed design may increase the DUSS's water temperature, increase output to 14.92 l/m<sup>2</sup> per day, and achieve an usual daily efficiency of 38.73%.

### Introduction

Gamel et al. [1] approved an experimental analysis to determine whether the energy & exergy effectiveness of solar stills are enhanced by 94.14% & 164.29%, respectively, when activated carbon tubes are used. They produce 5850 ml/m<sup>2</sup> of freshwater productivity. T. Kumar et al. [2] conducted an analysis of the SSSS using *Jatropha curcas* L. leaf extract as the green synthesis material for SiO<sub>2</sub>. They compared the act of the solar distiller during summer and winter seasons. Distillate yield was 8.79 L/day (SiO<sub>2</sub>/*Jatropha curcas* L.) and 6.49 L/day (SiO<sub>2</sub>). ZnO rice husk activated carbon was made by Adewumi et al. [3] using orthophosphoric acid activation. They came to the conclusion that 615 m<sup>2</sup> g<sup>-1</sup> of high surface area were useful for wastewater treatment after analyzing the physicochemical factors. When performing double slope solar stills, Sahota et al. [4] explored in load with multiwall carbon nanotube utilizing Al<sub>2</sub>O<sub>3</sub> nanofluid. Different nanofluid ratios of 0.4%, 0.8%, and 1.2% are used to analyze them. It is concluded that 1.2% was the focus of MWCNT performance of 43.2%. The double slope distiller was constructed by Ghandourah et al. [5] and coated with lanthanum cobalt oxide. Different water discharge rates (0.050 kg/min, 0.10 kg/min, and 0.20 kg/min) were studied.



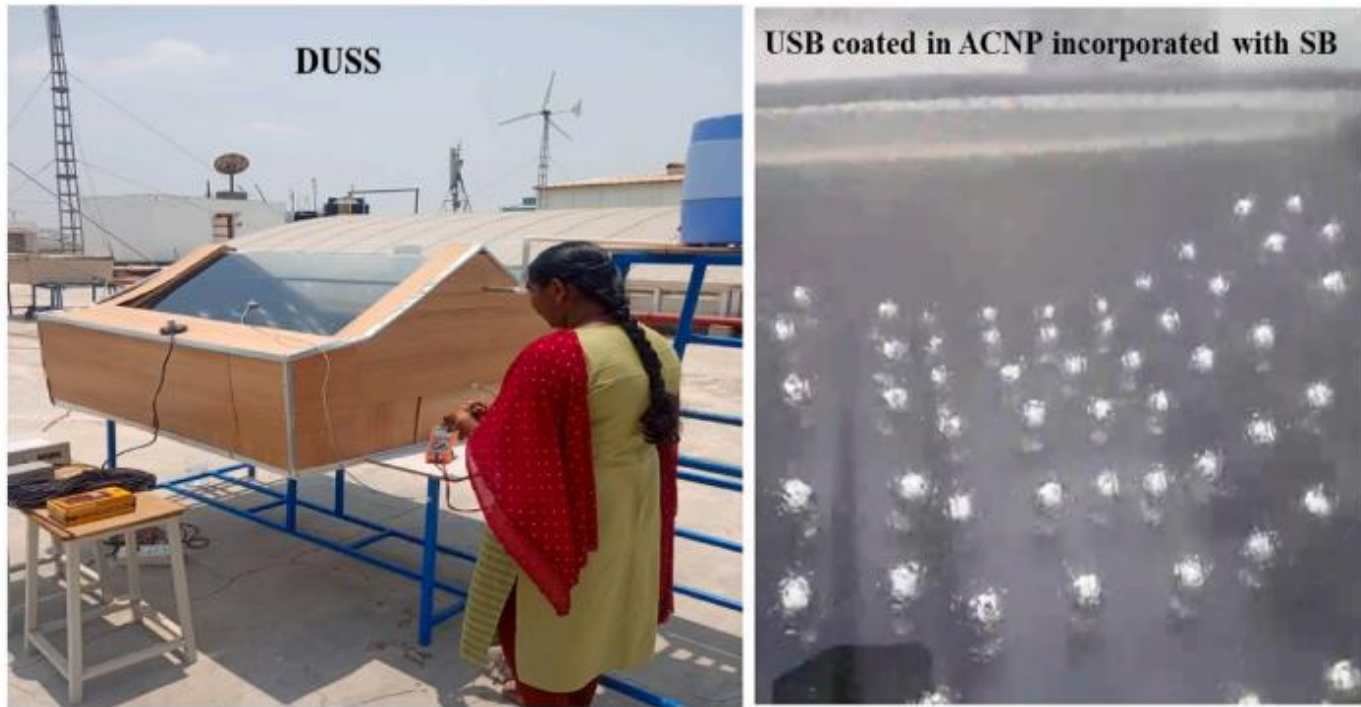


Fig.2. Experimental setup

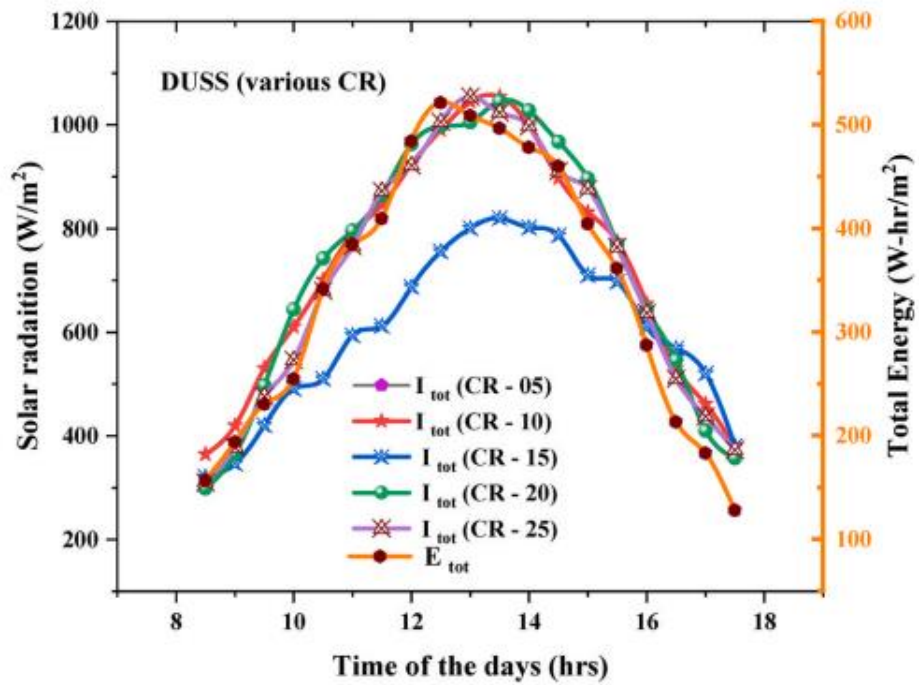


Fig.3. Solar intensity

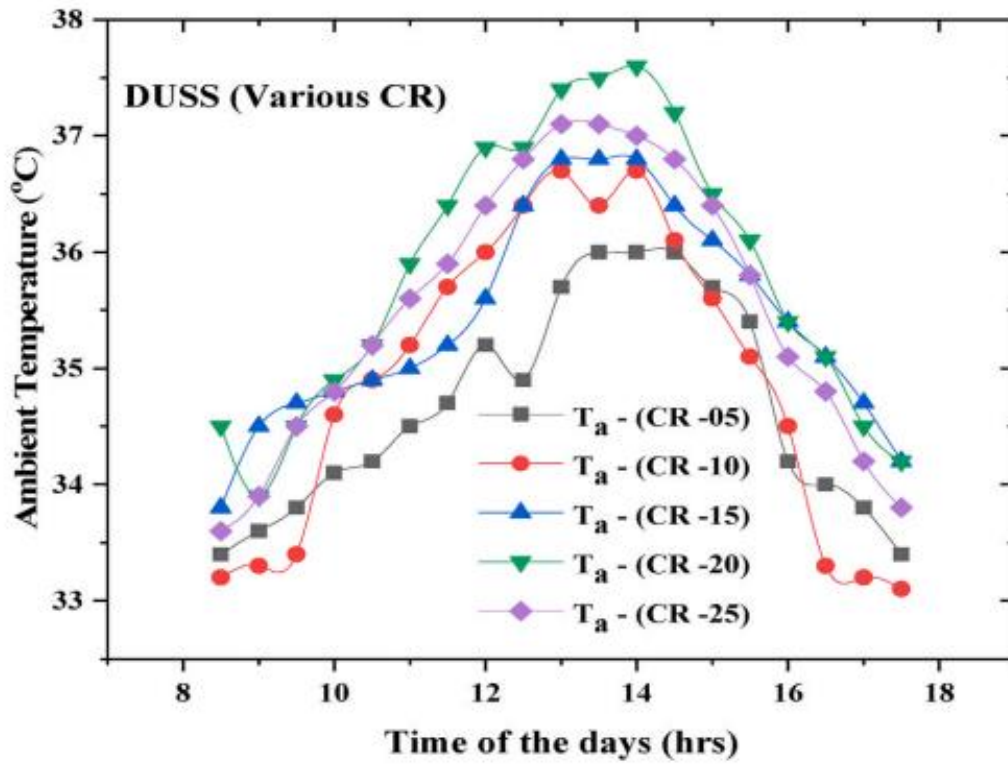


Fig.4. Ambient temperature

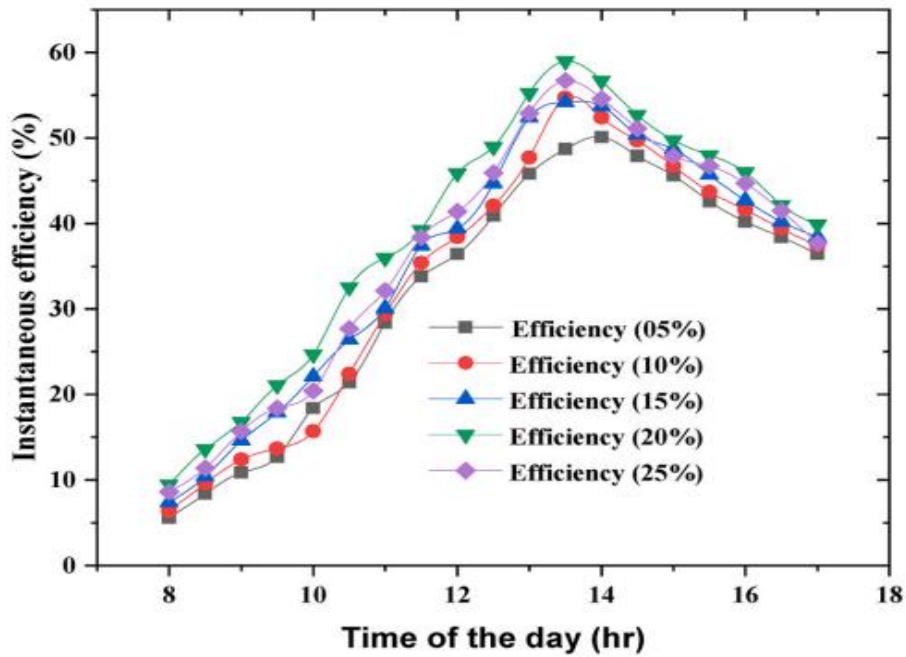
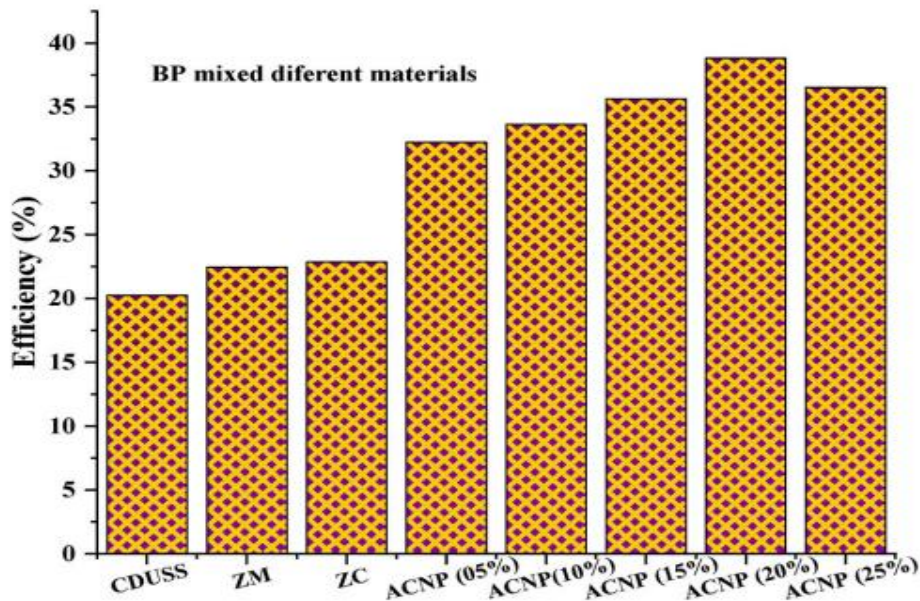


Fig.5. Overall efficiency





**Fig.6. Efficiency comparison**

## Conclusion

In relation to the TC improvement of 59.72%. The exergy was estimated simply and comparably using the Gibbs free energy equation for the temperature components of the DUSS. The BP-coated DUSS had the highest BPACNP loading (20 wt%), the day's average USB temperature of 15.8%, and the highest mass output (16.91%) when compared to the DUSS coated alone with BP. With a total distillate output of 14.92 l/m<sup>2</sup> per day and an average efficiency of 38.73%, the DUSS surpassed the CDUSS by 64%.

## Reference

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