

# Investigation of a Single Slope Solar Still Integrated with Gravels, Sand and Wick Materials: An Experimental Approach

## Abstract

Through tapping into the boundless resources provided by the sea and sun, scientists have created a sustainable and cost-effective drinking water supply using solar-powered desalination. In this manuscript, utilizing gravels, sand and wick materials as the energy storage medium is one of the key sustainability modifications made for bettering the rate of evaporation within solar stills, hence enhancing the freshwater yield. Here, experiments on a single basin solar still with and without energy storage components have been carried out. Typically, energy storage materials are employed to enhance the rate of evaporation in solar stills, aiming to increase the yield of distilled water during nocturnal hours. Consequently, it was observed that using locally available heat storage materials in a solar still during daylight and overnight production of distillate for 15 liter of water input resulted in increases of 54.39 and 58.08%, respectively. In the case of upgraded solar desalination systems, the maximum thermal efficiencies were notably improved, with increases of 90.843, 84.464, and 66.326% compared to conventional solar desalination systems for water inputs of 15, 20, and 25 liters, respectively. The suggested solar still design is particularly well-suited for generating freshwater in regions with a pronounced demand, such as areas characterized by excessively saline groundwater, coastal zones, and rural locations.

## Keywords

Alternate energy; Distillate output; Energy storage materials; Solar still; Thermal efficiency