

## Documents

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**Investigation on the performance of solar still with thermoelectric cooling system for various cover material**  
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### Abstract

In this study, an experimental investigation was performed to determine the effect of varying thermoelectric (TEC) cooling power on the solar still using different cover materials. Three types of cover materials, glass, polycarbonate (PC), and acrylic (PMMA), were studied for the TEC cooled solar still. TEC cooling power was varied from 12 W to 36 W by changing the applied TEC current from 2 A to 4 A. The study was conducted at Universiti Malaya, Kuala Lumpur, Malaysia which is located at 3.118°N latitude and 101.656°E longitude. The productivity of the solar still productivity with glass cover was increased by up to 76% when TEC cooling used a current of 4 A. The PMMA and PC covers had lower productivity compared to the reference solar still by up to -48% and -82%, respectively. The highest energy efficiency obtained by a solar still with TEC cooling for glass, PC and PMMA cover was 23.6%, 2.5%, and 7.2%, respectively. The average maximum exergy efficiency of solar still with glass, PC, and PMMA cover calculated to be 7.04%, 0.61%, and 2.13%, respectively. The economic analysis revealed that the lowest cost per litre was achieved by glass cover TEC cooling of \$ 0.042. © 2022 Elsevier Ltd

### Author Keywords

Cooling power; Cover cooling; Cover material; Solar still; Thermoelectric cooling system

### Index Keywords

Cooling systems, Distillation, Economic analysis, Energy efficiency, Glass, Meteorology, Solar heating, Thermoelectric equipment; Cooling power, Cover cooling, Cover materials, Experimental investigations, Glass covers, Performance, Solar stills, Thermoelectric, Thermoelectric cooling, Thermoelectric cooling system; Cooling; cooling, economic analysis, energy efficiency, exergy, performance assessment, solar power; Kuala Lumpur

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