



Simulation study of an air-gap membrane distillation system for seawater desalination using solar energy

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ABSTRACT

The paper presents a numerical study to investigate the solar membrane distillation (SMD) system for seawater desalination using solar energy. The SMD system includes both flat plate collectors and photovoltaic panels. Therefore, the photovoltaic system is used to power electrically the pumps and sensors. The present model has good compatibility of no more than 5% with the experimental air-gap membrane distillation (AGMD) system. It was found that the solar AGMD system is used for the production of 3–5 L/h of distilled water flow. In addition, the energy needed is calculated for the pumps and replaced by two photovoltaic panels, each one has an area of 1.6 m² using an energy storage battery (12 V, 200 Ah). Besides, the brine that contains the high salt concentration is completely dispensed with this process. Therefore, the energy efficiency of the AGMD module and the collector efficiency values reach 68% and 74% respectively. The solar AGMD system will be studied using TRNSYS and PVGIS programs on different days throughout the year in Ain Temouchent weather, Algeria.

Keywords: Solar desalination; Membrane distillation; Photovoltaic system; Solar-thermal system; Seawater

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