



ملخص البحث باللغة الإنجليزية:

" Study of a solar-driven membrane distillation system: Evaporative cooling effect on performance enhancement "

This paper presents an experimental investigation of a solar thermal driven membrane distillation-based desalination system (SDMD). The system consists of direct contact membrane unit and evacuated tube solar water heater assisted by evaporative water cooler. This study was carried out on a pilot system installed at the University of Tanta, Tanta, Egypt. The laboratory work has been carried out in an actual thermal environment in June 2016. The novelty of the system is the performance enhancement of an integrated desalination system assisted with evaporative cooler. The system efficiency is affected by increasing of water mass flow rate more than the increasing of air mass flow rate and reaches about 49.01%. The thermal performance of the system is measured by the gained output ratio (GOR) with daytime. The GOR of the system reaches 0.49. Also cooling water flow rate influences water extraction, however productivity decreases with increasing of cooling water temperature. Maximum productivity was 33.55 L/day. The pressure drop and pumping power across membrane were calculated. The pressure drop in cases of feed water flow rate 10 L/min is 158.89 N/m² and 0.0263 Watt pumping power. While in cases of feed water flow rate 15 L/min the pressure drop is about 336.61 N/m² and about 0.0828 Watt pumping power. The use of the cooling unit significantly increased the system productivity, almost 1.25 of that without the cooling unit.