



Experimental investigations on a multi-stage water desalination prototype

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ABSTRACT

The present work proposes a new multi-stage distillation system that was designed in UDES with the objective of increasing its productivity and improving its efficiency. The aim was to develop a simple and economic multi-stage solar still to produce freshwater for domestic and socioeconomic sector uses from seawater and brackish waters that are abundant in many remote areas of the Algerian Sahara. We study the effect of cooling water temperature and collected experimental data in order to optimize their influence on the yield of the multi-stage distillation process for the first four-tray device. The preliminary results showed a significant improvement of the overall productivity. The effect of the boiler temperature T_b is presented for different values. Indeed, the total productivity of the still is affected by the increase of the cooling water flow rate on top of the tray. The experimental results show that the first tray of the system produces about 35 l of freshwater per day and the temperature of the evaporator efficiency is fixed at 96°C. The results that permit the determination of the output of each tray of the still are presented in this study. The analysis of the distilled water showed that its quality was within the international standards (World Health Organization guidelines).

Keywords: Distillation; Desalination; Multi-stage still; Solar; Energy

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