

Development, Manufacturing, and Testing of Sea Water Solar- Driven Desalination System

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Abstract

There is an increase in human desalinated water needs in spite of limited sources, so it is important to find alternative ones like uses of solar energy, in addition to utilize other sources. Red Sea areas are very hot in summer season especially in May, June, July and August.

In this study, a device that uses solar energy as a driving power for seawater desalination has been developed, manufactured and tested. Many experiments have been processed to investigate the system production during the summer season conducted on Red Sea coastal area.

The results showed that the device able to produce quantities ranged between the highest (4300 ml) and the lowest (2350 ml). The highest reading for the distilled water was registered on 24 August 2021 (4300 ml) when the weather is so hot and wet.

While the lowest reading for the distilled water production was registered on 27th June 2021 (2350 ml) when the climate was cloudy and dusty during the test.

Results also showed that adding a reflector to concentrate the solar radiation on the water basin could improve the system output effectively. The obtained results can be considered a base stone for uses of solar energy for covering the high demand of fresh water for small communities along Red Sea coastal area.

المستخلص

هنالك تزايد في حاجة الانسان لمياه عذبه او محلاه بالرغم من محدودية الموارد.

في هذه الدراسة تم تصميم وتصنيع واختبار جهاز لتحلية مياه البحر بواسطة الطاقة الشمسية.

أجريت عدة تجارب للتحقق من انتاج المنظومة خلال فصل الصيف بمنطقة ساحل البحر الأحمر ، ومن خلال تلك التجارب استنتجت الدراسة أن أعلى درجة قراءة لإنتاج المياه المقطرة كانت (4300 مل) وأدناها (2350 مل) وأن أعلى قراءة للمياه المقطرة وهي (4300 مل) سجلت في 24 أغسطس 2021 ، حيث يتسم الطقس بالحرارة والجفاف الشديدين ، بينما أدنى قراءة للمياه المقطرة سجلت درجتها (2350 مل) في 27 يوليو 2021 نتيجة للطقس الغائم ذي الغبار العالق.

كما أثبتت التجارب أن إضافة عاكس لتسليط أشعة الشمس على حوض المياه من شأنه أن يحسن مخرجات إنتاج المنظومة بشكل فعال

تعتبر النتائج التي خرجت بها هذه الدراسة هي الأساس لأي استخدامات مستقبلية للطاقة الشمسية وبالتالي تغطية حاجة المجتمعات الصغيرة على ساحل البحر الأحمر لتوفير المزيد من حاجتها للمياه العذبة.

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This chapter has evaluated the study and summarized the recommendations of the research, suggested potential areas for further research on development manufacture and testing of device for distillation of sea water using solar energy.

The main highlighted point in this study is that; there is observable increasing in produced distilled water comparing with the results of Amar Awad, etals' study (2012), but what featured the recent study is adding solar collector, solar reflector and good isolation.

And finally, proposed some remedial solutions to the research problem and realistic implication for the study.

5.2 Recommendations

- a. The necessity to get calibrated sensors and ensure that they checked in laboratory and able to determine the error ratio.
- b. The study recommends the upcoming researchers that they have to use thermal isolator with excellent specifications.
- c. It is very important to use multi-layers glass so as to reduce thermal-co-efficient and losses.
- d. The necessity to adopt such project by the researches institutions and commercial firms, whereas the recent project considers small model.
- e. The study recommends to apply the recent device system tests on all Red Sea Costal locations in addition on other world sites which are resemble in its weather to the weather of Red Sea Basin.
- f. Seeking technique means to maintain quite enough saved energy so as to use it upon needed especially in night times.
- g. Primary Preparations tests should be accompanied by concave mirror which is necessary to concentrate the solar radiation; this will increase production of fresh water.
- h. Solar collector should be imported according to high specifications to ensure efficient production of fresh water.
- i. Raising the number of solar reflector to enough concave mirrors.
- j. The study recommends to design quadrate glass sheets, so as to ensure continuity of sun rays exposure from sunrise, day-time and to sunset.
- k. Establishment Side projects of the production.