

Design, Method And Material Used For Desalination Techniques - A Review

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Abstract- The solar desalination technique is to convert the contaminated water into fresh water in the basic principle of evaporation and condensation. The techniques are reduce the demand of water conservation problems in various places and to reduce the usage of electricity. The effective various design of solar still classifications and their efficiency. In the effective paper tells about the above classification and their processing details. The simplified paper can be anyone easily understand the types, basic principles and factors to be increase the performance of the designs.

Keywords- evaporation, condensation, slope, basin and efficiency.

I. INTRODUCTION

The earth is consist of more than seventy percentage of water stages. But all the stages of water can not be used residential applications of drinking, cooking and bathing purposes. The demand of water is also a major causes is population growth. So the problems can be reduced that many desalination techniques are available in and around us. The process is done on natural and artificial methods. The natural methods are performed well and friendly to the environment and not polluted the surrounding. The recent advancements are increases the efficiency of the system when compared to the existing methods. The solar desalination techniques are avoid and minimize the usage of artificial water purifiers.

II. BACKGROUND

The uneven rainfall will reduce the water table in underground is the main causes of water demand. In most of the water stages are polluted automatically by the source of human wastes. But the another side fresh water in the form of ice bars and it is easily mingled with the ocean. The growth of automobile industries, air conditioners and refrigerators are the main source of acid rain. The problems can be reduced by the desalination techniques by converting the contaminated water into fresh water. It can be done on both renewable and nonrenewable energy sources. The fossil fuels are extinct on

future, so the solar energy is used for the converting contaminated water into fresh water by using basic principles.

III. PRINCIPLE

The desalination techniques are only done on two basic reactions such as evaporation and condensation. Evaporation is the process of converting liquid phase into vapour phase by the heating of the liquid. Condensation is the process of converted vapour phase is change into liquid form. The evaporation and condensation is takes place only inside the closed system and there is no contact between the outer and inner side walls.

IV. CLASSIFICATION

There are various types of desalination methods are available to convert the contaminated water into fresh water by the above principle of evaporation and condensation. Because the fresh water is more valuable and it is also used for agricultural purpose. The variety of materials and methods used to increase the productivity of the desalination techniques. The classification can be done on the number of slope, basin, materials and methods used.

1. In the single basin solar still has the effective area is made of stainless steel and the glass is cover the galvanized iron frame at the 25° of inclination. The rubber gasket is used to tight the joints at the corners. The design has there is no special absorbing materials are used. But three types of materials are used in the kind of system, Such as black die in water solution, black ink in water solution and black absorbing rubber mat. The black die is also increase the productivity of the solar still.
2. In the desalination technique has the storage medium is phase change material. The basin is made of black painted galvanized iron sheet with minimum thickness. The side and bottom layers are insulated with the wood frame contained saw dust. The end of the glass cover has the aluminum channel is fixed for collecting the fresh water and the glass is inclined at the angle of 22.73°. In this

technique has the phase change material is increased the efficiency of the still.

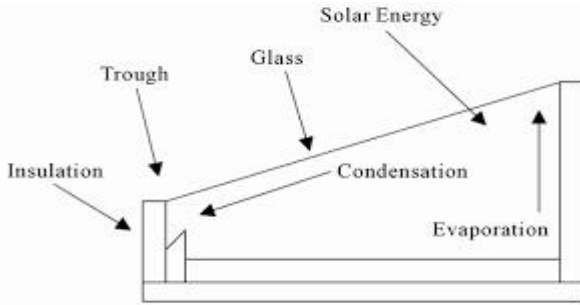


Fig 4.1 single slope and basin solar still

3. The effective design of the single basin still has the length and width is made of 316 stainless steel. The bottom and side walls are made of styrofoam and it is reduce the heat conduction. The double slope solar still has the top glass cover is inclined to the angle of 35°. The top glass is attached to the galvanized iron frame. In the rubber gasket is used to tight the seal between the frame and basin. The north and south side of the two bottles are collect the fresh water from the inclined glass surface.

4. In this kind of solar still has the storage medium in sand. The basin area is made of black painted galvanized iron sheet. The side and bottom walls are made of saw dust contained wood frame. The thick soda glass is cover the solar still at an angle of 21.76°. In the afternoon sand is the source of heating purpose.

5. The basin is made of iron sheet and it is absorbed the maximum amount of solar radiation and transmitted inside the glass cover. The absorbed capacity can be improved by using asphalt and glossy black paint. The glass cover is placed at an angle of 32°. The efficiency of the still can be increased by the silicon rubber is used for sealing purpose between the frame and glass. In the rock wool is used for as a insulating material. The total performance can be increased by using reflected mirrors are inside the solar still.

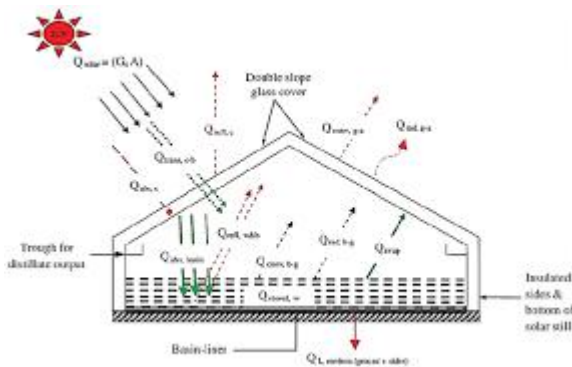


Fig 4.2 single basin and double slope

6. The active solar still has the source of flat plate collector. The shape of the basin is square and the pyramid shape glass cover is placed at an angle of 45°. The insulation can be maintained by using rock wool. In the design all the components are installed in a single frame.

7. The triangular basin is made of copper sheet and the bottom layer is painted by black color. The top layer is inclined to 32° angle. The copper sheet is painted by the matt type black paint. In silicon rubber is used to seal the intermediate gap between the frame and glass cover. The side and bottom walls are made of thermo cool and it is the main purpose of insulation purpose. The outbox is made of wood and inside the still has filled with the contaminated water.

8. In the asymmetric greenhouse type still has the frame is made of iron. The body is made of wood and it is facing towards south direction. The angle of solar still glass cover is 32° and the rock wool is used for insulating purpose.

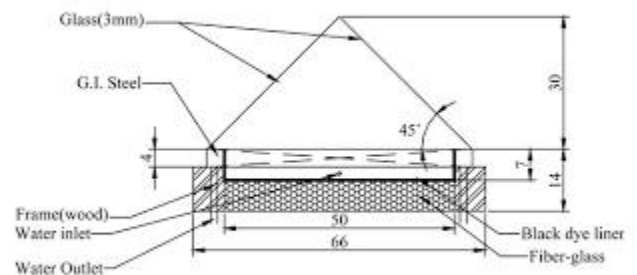


Fig 4.3 single basin cone solar still

The above diagram represent the single basin and single slope solar still. The contaminated water is purified after the evaporation and condensation process. In the side and bottom layers are made of some insulated materials for the purpose of insulation. The fresh water is stored in a end of the glass cover and the solar radiation is absorbed by the glass cover and it is transmitted inside the system.

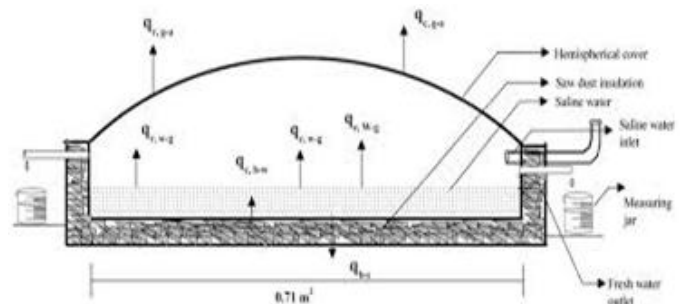


Fig 4.4. single basin curved glass cover

9. The double basin solar still has the basin is made of mild steel and the side and top walls are made of insulated materials. The top cover is black painted. The silicon rubber is provided for sealing purpose and it is also use to increase the efficiency of the system. The solar glass cover is placed at an angle of 35 to 37. An aluminum frame is provided for reflector plate.
10. The top of the glass cover is transparent and the flat plate collector is absorb the maximum amount of solar radiation and it is transmitted through the glass cover. An aluminum is placed for the bottom layer for reduce the heat loss and the side and bottom layers are covered with the wood. The solar still is facing north-south direction for the maximum absorbing purpose.

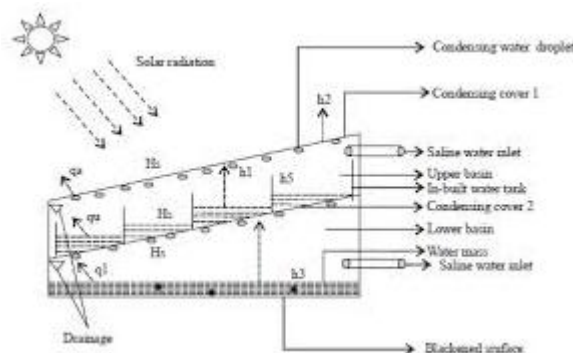


Fig 4.5 single slope double basin

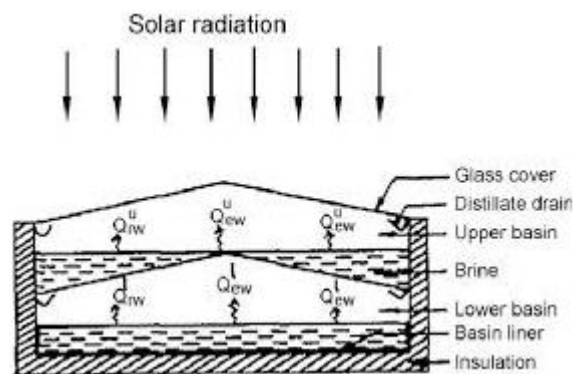


Fig 4.6 Double slope double basin

The stepped solar still has the perfect desalination is possible. Because the number of stepped basin has increase the performance of the system and the double basin has the insulated layers are inserted only in side walls and bottom layer of the design. The intermediate distance of the two basin has not insulated properly. Because the purpose of conduction is possible and also productivity is maximum. The another major case is the collectors are facing directions are most important. So the glass cover is facing in north-south direction its productivity is increased in all the kind of the

design. The above processes are the ancient days of operating characteristics. But now a days the advanced materials and design are used for the desalination techniques. A pre heating chambers are also provided for increasing the efficiency of the solar still. The phase change materials are absorb the maximum amount of solar radiation during day time and it is reflect in the afternoon time.

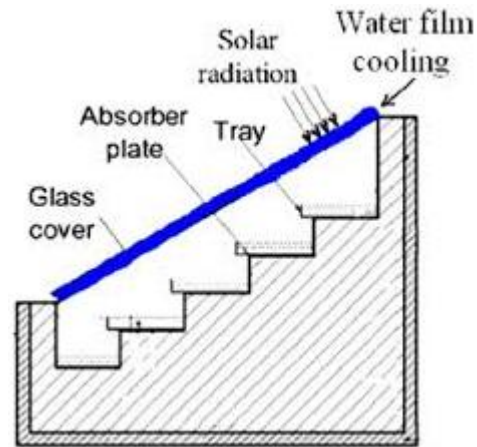


Fig 4.7 stepped solar still

V. COMPARISON TABLE

Author name	NOS slope and basin	Absorbing material	Angel of glass cover	insulated medium
Bilal[1]	single	no	25	rubber gasket
Sebaii[2]	single	Phase change material	22.73	wood
Nijmeh[3]	double	Galvanized iron sheet	35	styrofoam
El-Sebaii[4]	single	sand	21.76	Saw dust contained wood frame
O.O. Badran[5]	double	asphalt and glossy black paint	32	Silicon rubber and rock wool
Ali Badran[6]	A. Flat plate	no	45	rock wool
M. Koibraj Gnana dason[7]	single	matt type black painted copper sheet	32	Silicon rubber and thermo cool
Renuka Deshmukh[9]	double	Transparent glass cover	35 to 37	Silicon rubber

Table 5.1 Comparison table

VI. CONCLUSION

The effective simplified paper is explained about the various methods, materials and designs used for the desalination techniques for the purpose of water purifying purpose. Because the above mentioned methods are used for

reducing the usage of fossil fuels and electricity for the purpose of desalination. The present day of operation has advanced materials and design are used to increase the productivity of the fresh water converting process. Because the fresh water is more valuable and it is required for many purposes, such as household and agricultural applications. The investment of the design is very minimum when compared to the artificial techniques.

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